ESSAYS ON SOCIAL POLICY IN VICTORIAN ENGLAND

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ESSAYS ON SOCIAL POLICY

IN VICTORIAN ENGLAND

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On the day she died—January 22nd, 1901—Victoria was Britain's longest reigning monarch. Britain (and the world) had been transformed during her reign. It had elected ten prime ministers, including Russell, Palmerston, and Disraeli twice; Derby and Salisbury thrice; and Gladstone four times. The United States had elected eighteen presidents. Van Buren was inaugurated only 481 days before her coronation. McKinley was shot only 227 days after her death. Between 1837 and 1901, Britain's population had more than doubled. Where in 1837 there was little but arable- or pasture-land, in 1901 there were cities, roads, railroads, new industries, and new forms of local government. This transformation, however salutary, was profoundly disruptive. There was immigration into Britain. There was immigration within Britain. Infrastructure was built. Vaccinations were discovered. The business cycle displaced meteorology as the most important source of economic uncertainty. In the following three essays, I explore three reactions to these sundry disruptions.

In the *first* essay, I explore the Public Health Act of 1848—England's first attempt at systematic sanitation reform—and, in so doing, I provide quantitative evidence of the effect of public health interventions on mortality in a decidedly developing country. Between 1848 and 1870, the Public Health Act oversaw the adoption of more than 600 local boards of health (which, combined, affected roughly one-quarter of the English population). The Act endowed these boards

with the power to tax, borrow, regulate, provide sanitary services, and build, re-build, seize, or otherwise alter local infrastructure. Since the jurisdictions of local boards of health and the jurisdictions of Poor Law unions (i.e., the local geographical units within which mortality statistics were recorded) were not coterminous, the mortality effects of the Public Health Act have been largely unexplored. I introduce a new panel dataset that maps the jurisdictions of local boards of health into the jurisdictions of Poor Law unions. I then leverage variation in both the timing and extent of board adoption across Poor Law unions in order to estimate the cumulative effect of the adoption of a local board of health on mortality 1, 2, 3, and 4 years after adoption. My estimates suggest that the adoption of a union-wide local board of health reduced mortality by 14.2 percent after four years, that approximately 225,000 lives were saved by local boards of health between 1848 and 1870, and that the aggregate English mortality rate was 3.7 percent lower in 1870 than it would have been had the Public Health Act not been passed.

In the *second* essay, I explore the relationship between welfare generosity and welfare caseloads. Between 1601 and 1948, the English welfare system was the Poor Law. It provided working-class men, women, and children with a vital, if meager, guarantee of support in the event that they sustained a negative income shock. According to many contemporaries, it also encouraged indolence. In the late 1860s and 1870s, objections to any guarantee of support grew more vocal and more politically formidable. Some localities began to relieve a significantly greater proportion of welfare recipients in workhouses—deliberately disagreeable dwellings intended to disincentivize welfare recipiency. This movement was, in effect, a de facto, decentralized welfare reform. I use variation in the change in the proportion of welfare recipients relieved in workhouses between

1865 and 1880 across English localities to estimate the effect of workhouse use on the rate of welfare recipiency. First, I introduce a new panel dataset of Poor Law unions—local geographical units that administered the Poor Law, of which there were approximately 600. Second, I employ a difference-in-differences model to estimate whether and to what extent the workhouse affected the rate of welfare recipiency. I find that approximately three in four welfare applicants to whom the workhouse was offered as a "test" refused the offer. I also find that this "workhouse effect" was insufficiently large to meaningfully reduce the costs associated with the workhouse. Third, I employ a triple-difference model to estimate whether welfare applicants to whom the workhouse was offered were more likely to reject the offer if the workhouses in which they would be relieved were deficient in ventilation, water supply, general sanitation, or diet. I find that they were not.

In the *third* essay, I explore the relationship between wealth and welfare generosity. Were, for example, wealthier people or places more or less likely to favor redistributive policies, such as a welfare system, *because of* their wealth? I isolate quasi-experimental variation in per capita property wealth across English Poor Law unions to quantify the causal effect of wealth on welfare generosity. Poor Law unions were local geographical units, of which there were approximately 600 in 1881, that administered the English welfare system. They were, for all intents and purposes, autonomous mini-welfare states, in each of which a board of guardians determined the level of generosity. They were also agglomerations of parishes—hyper-local geographical units, of which there were approximately 14,000 in 1881. Each parish was entitled to a certain, pre-determined number of guardians to represent it on the board of the Poor Law union to which it belonged. Guardians were rarely apportioned to parishes in proportion

to their population. Some parishes—typically the wealthiest, least populous parishes within a Poor Law union—were over-represented. Others—typically the poorest, most populous parishes within a Poor Law union—were under-represented. Moreover, the *extent* of the over-representation of the wealthiest parishes varied across Poor Law unions. This is the variation that I leverage. I introduce a new dataset that includes the number of guardians, the population, and the property wealth of each English parish, as well as two distinct measures of the welfare generosity of each English Poor Law union. I then use a measure of the malapportionment of guardians—and, consequently, of the over-representation of wealth on boards of guardians—as an instrument for wealth. This instrument is both strongly correlated with wealth (by construction) and uncorrelated with all other union-level variables that are both available and potentially related to welfare generosity. I find that wealth *itself* caused neither an increase nor a decrease in welfare generosity.

BIOGRAPHICAL SKETCH

Maxwell D. Kiniria grew up in Michigan—the pleasantest of peninsulas. His fondest memories include trips to Frankenmuth, Houghton Lake, and Greenfield Village. Before arriving at Cornell, and between Detroit Tigers' World Series appearances in 2006 and 2012, he received a B.A. in Economics from the University of Michigan. It was in the Winter of 2008 that an interest in Economics befell him, in the Winter of 2010 that an interest in Economic History befell him, and in the Winter of 2012 that an interest in English Economic History befell him. A dismal science for a dismal season (unless you're a hockey player).

To my parents.

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The author thanks, first and foremost, his family. His parents and grandparents sacrificed a great deal to give him an education. Although this education did not include anything useful or remunerative, if one were to ask the author about the 1971 MLB All-Star Game, he would be well equipped to answer. The author is, like his father, "a simple man with simple needs."

He also thanks his advisory committee—Professors George Boyer, Michael Lovenheim, and Nicholas Sanders—as well as Professors Claire Lim, Robert Hutchens, Tom Lyons, Levon Barseghyan, Kristoffer Nimark, and Eleonora Patacchini. They, among other Cornell faculty and staff, could not have been more helpful to or supportive of him.

He also thanks his fiancée. Her (intermittent) love, (begrudging) sympathy, and Staten Island charm (an oxymoron) were absolutely indispensable—as were her Latex skills, without which these words would not be written on these pages.

He also thanks his fellow graduate students. Their camaraderie was unwavering. After so many hours of playing basketball badly in Barton Hall, one begins to feel as if he must be an intellectual.

He also thanks his friends. Without their humor, nothing would matter.

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CHAPTER 1

THE MORTALITY EFFECTS OF LOCAL BOARDS OF HEALTH IN ENGLAND, 1848-70

1.1 Introduction

The health improvement that the developed world has achieved since the middle of the nineteenth century has been well-documented [42, 32, 102]. Infants are more likely to reach adolescence, adolescents are more likely to reach adulthood, adults are more likely to reach old-age, and many of the key killers of the nineteenth century (e.g., tuberculosis, typhoid, typhus, cholera) have been all but eliminated. Figures 1.1 and 1.2 illustrate this achievement. Life expectancy at birth increased by at least 60 percent between 1800 and 1950 in France, Germany, Japan, the Netherlands, Sweden, and the United Kingdom. Average height, for which both nutrition and exposure to disease are in part responsible, also increased in each of these countries between 1850 and 1900 and again between 1900 and 1950.

What is less well-documented is the extent to which public health interventions, especially *early* public health interventions, contributed to this health improvement. Rising incomes and the emergence of modern medicine have confounded attempts to quantify the importance of, for instance, the introduction of sewage systems, water pumping plants, water treatment plants, and industrial regulations. McKeown & Record (1962) and McKeown (1976), using mortality records from England and Wales, demonstrate that a decline in communicable disease was largely responsible for the decline in mortality during the second half of the nineteenth century, and that this decline in communicable disease

pre-dated, by decades, the discoveries of any medical solutions thereto (e.g., vaccinations) [81, 80].[1] Instead, they attribute the bulk of the decline in mortality to increased nutritional intake made possible by rising incomes. Szreter (1988, 1997), on the other hand, argues that public health interventions played a leading role in the mortality decline between 1870 and 1900 [104, 106]. Cutler & Miller (2005), Watson (2006), Ferrie & Troesken (2008), and Alsan & Goldin (2015) corroborate the significance of public health interventions in the late nineteenth and early twentieth centuries, but only for selected cities in the United States [31, 110, 40, 15].

Evidence suggests that it is in the midst of a country's transition from rural to urban and from agricultural to industrial that it is most susceptible to negative health shocks, and hence is most in need of intervention. Table 1.1 demonstrates that rapid health improvement tended to lag the rapid economic improvement generated by industrialization by between 25 and 50 years. Table 1.2 demonstrates that industrialization and its concomitants (e.g., slum formation, overcrowded cities, insufficient infrastructure) adversely affected health, as proxied by height, in the short run. Today's transitioning economies are hardly immune to these concomitants, however ameliorated they are by higher incomes and the knowledge of, if not access to, modern medicine.[2] As such, an understanding of the capacity of early public health interventions serves a dual role as both historical description and contemporary prescription.

[1] Vaccinations for the most important communicable diseases did not appear until the late 1870s: cholera (1879), typhoid (1896), diphtheria (1896), tuberculosis (1921), whooping cough (1926), typhus (1937). It was not until around 1900 that the germ theory of disease began to displace "misguided miasma theories" [92, p. 6].

[2] In India, Indonesia, and the Philippines, for example, the incidence of tuberculosis is between 70 and 130 times higher, the percent of deaths by communicable disease is between 2 and 4 times higher, and the rate of infant mortality is between 3 and 6 times higher than it is in the United States. Consequently, the life expectancy at birth in these countries is between 10 and 11 years shorter than it is in the United States (as of 2015). See World Bank Database: data.worldbank.org.

In this essay, I evaluate the mortality effects of the Public Health Act of 1848—England's first attempt at systematic sanitation improvement—and, in so doing, I provide clear quantitative evidence of the relationship between public health and mortality in the context of a transitioning economy. The state of English sanitation on the eve of the Act was grim. Englanders in the 1840s died at roughly three times the rate at which Englanders die today and, proportionally speaking, about as many Englanders died from cholera, diarrhea, diphtheria, dysentery, respiratory organs, tuberculosis, typhus, and whooping cough (8.5 per 1,000 persons) as die from *any* cause today (9.3 per 1,000 persons).[3] Neither the quantity nor the quality of infrastructure was sufficient to meet the drainage and water supply requirements of a rapidly growing urban population in a rapidly industrializing economy. In the half-century before the Act, England's population had doubled (from 7.75 to 15.25 million) and had become increasingly concentrated in urban centers (from 33.8 to 54.0 percent). The number of cities of more than 3,000, 10,000, and 20,000 people roughly doubled, tripled, and quadrupled, respectively. In 1801, London was the only English city of more than 100,000 people. By 1851, it was one of nine [64].

It was against this backdrop, and as a result of the efforts of a great many sanitary reformers, that the Public Health Act was passed. The Act oversaw the adoption of more than 600 local boards of health between 1848 and 1870, and by 1870 the jurisdictions of these local boards of health accounted for approximately one-quarter of the English population. Each local board of health was endowed with a variety of powers by which to effect sanitation improvement, including the power to tax, to borrow, to provide certain services (e.g., street

[3]The mortality rate was significantly higher for English infants, who died at a rate of no less than 125 per 1,000 births until the 1910s, roughly 30 times the rate at which they die today. I use 1859 cause-of-death data from the twenty-fourth *Annual Report of the Registrar-General* (1861), the first of these reports to disaggregate mortality by cause at the registration district level.

sweeping, the removal of refuse and rubbish), to regulate certain activities (e.g., new construction, the disposal of industrial waste), and to build, re-build, seize, or alter local infrastructure such as sewers or other waterworks. Local boards were adopted, for all intents and purposes, voluntarily, upon the petition of at least ten percent of the taxpayers within a given "area." Since "area" was undefined by the Act, the jurisdictions of local boards did not match—except by accident—the jurisdictions of any other administrative subdivision of England, including the administrative subdivision within which mortality statistics were recorded and reported (i.e., the Poor Law union). This geographical mismatch has heretofore made it impossible to estimate the effect of the adoption of a local board of health on mortality.

I make two principal contributions. First, I construct a new, comprehensive dataset of local boards of health adopted in England between 1848 and 1870 from a variety of overlooked or otherwise unused primary sources. I overcome the geographical mismatch between local boards of health and Poor Law unions by mapping each local board of health into the Poor Law union or unions within which it was adopted. I then characterize each Poor Law union, of which there were approximately 600, by the proportion of its population that fell under the jurisdiction of a local board of health in each year. Figure 1.3 illustrates the variation that I observe in the extent of local board adoption across unions and over time. This variation enables me to adopt a difference-in-differences framework that accounts for fixed differences across unions and, thereby, to improve upon existing time-series analyses of the role played by public health interventions in England's nineteenth century mortality decline. Without geographical variation, these analyses have been compelled to compare the timing of the decline of *aggregate* English mortality, often disaggregated by age or cause-of-death, with

the timing of other England-wide changes.[4] Since aggregate English mortality, presented in Figure 1.4, did not begin to decline precipitously until the 1870s, the implicit consensus of this literature is that English public health efforts prior to 1870 were non-existent, ineffectual, or obstructed by municipal inactivism. This consensus takes for granted that mortality between 1848 and 1870 would not have been higher had the Public Health Act of 1848 not been passed.

Second, I conduct the first (to my knowledge) econometric study of the effect of a national public health intervention on pre-1870 mortality rates. I use an event study model that leverages variation in both the timing and the extent of local board adoption across unions. My estimates reveal a clear and statistically significant break in relative mortality trends in the year of board adoption. Following Finkelstein (2007), I interpret the difference between pre- and post-adoption trends as an estimate of the impact of the adoption of a local board of health [41]. I calculate that the adoption of a union-wide local board of health would have reduced mortality by 14.2 percent after four years. Accounting for the proportion of the English population that fell under the jurisdiction of a local board of health, this amounts to a 3.7 percent reduction in aggregate English mortality by 1870, or approximately 225,000 lives saved. I also calculate that the benefits of the adoption of a local board of health, as measured by the total statistical value of the lives that they saved, exceeded the costs of the adoption

[4]This literature dates to the nineteenth century. See [69], [90], [44], [68], [81], [80], [104], [48], [105], and [106]. One of the advantages of my approach is that I need not rely on notoriously unreliable cause-of-death data. It was not until 1845 that the General Register Office (GRO) began to issue medical practitioners printed forms for the purpose of certification, not until 1860 that more than 80% of registered deaths were certified, not until the Registration Act of 1874 that the procedure for certification was standardized, and not until the 1880s that GRO statisticians were empowered to submit confidential inquiries to double check ambiguous death certificates. Moreover, misdiagnoses were commonplace. The quality of medical science and of medical practitioners was not what it is today, and socially sensitive causes of death such as alcoholism, syphilis, or suicide were very often intentionally misdiagnosed for the sake of the reputations of the families of the deceased. See [37], [38], [70], [52], and [17] for a more comprehensive discussion of the shortcomings of mid-nineteenth century cause-of-death statistics.

of a local board of health, as measured by total board expenditure, under all but the unlikeliest of assumptions about the relationship between board borrowing (which I do observe) and board spending (which I do not).

The remainder of this essay is organized as follows. In Section 1.2, I provide a brief sketch of relevant English local government areas; enumerate the sources from which my dataset is drawn; illustrate the procedure by which local boards were adopted, created, and composed; summarize the powers endowed to local boards; and assess the extent to which these powers were exercised. In Section 1.3, I introduce my empirical model, discuss identification and potential threats to identification, interpret my results, and conduct a back-of-the-envelope cost-benefit analysis of local board adoption. In Section 1.4, I conclude.

1.2 Institutional Background

1.2.1 English Local Government Areas & Data

English local government areas in the nineteenth century were, in a word, a "chaos" [67, p. 79].[5] Inhabitants of municipal boroughs, for example, "lived in a fourfold area for local government purposes—the borough, the parish, the union, and the county," and this is to say nothing of the hundred, the riding, the ward, the cinque port, the police district, or the parliamentary constituency. In this section, I illustrate the geography of and the relationships between each of the three administrative subdivisions of England upon which the rest of this

[5]Of English local government, George Goschen wrote in 1871 that "we have a chaos as regards authorities, a chaos as regards rates, and a worse chaos than all as regards areas."

essay relies: (*i*) the *parish*, (*ii*) the *union*, and (*iii*) the *local board of health*. I also introduce the data that I employ within each subdivision and the sources from which these data are drawn and transcribed. A more detailed description of the way in which my dataset is constructed can be found in the Data Appendix.

The Parish. A descendent of the Saxon "vill" or township, the parish was, in its infancy, the ecclesiastical counterpart to the feudal manor [67, p. 24]. By the beginning of the nineteenth century it had acquired a hodgepodge of administrative functions, including, but not limited to, the keeping of the peace, the repression of vagrancy, and the relief of destitution [111, p. 4]. For the purposes of this essay, the parish is significant because it was the smallest subdivision in the hierarchy of English local government, and therefore the subdivision in relation to which both the union and the local board of health were defined [94, pp. 22-23]. There were approximately 13,000 parishes in England by the middle of the nineteenth century. Panel A of Figure 1.5, for example, plots the boundaries of each of the 242 parishes within the county of Berkshire.

The Union. The union was conceived as an intermediary between the parish and the county by the Poor Law Amendment Act of 1834, which required an administrative subdivision that would be, on the one hand, large enough that its tax base could conceivably finance the construction and operation of a workhouse, and, on the other hand, small enough that the average commute for welfare recipients and welfare administrators would not be prohibitively lengthy. Parishes failed the first test. Counties failed the second. The solution was to agglomerate parishes into approximately 600 unions of parishes that, when brought into existence, would become "by far the most complete governmental organization in the country" [28, pp. 62-63]. Panel B of Figure 1.5, for example,

plots the boundaries of each of the 12 unions in the county of Berkshire, as well as the boundaries of the parishes of which these unions were made up. This organization was subsequently used to superintend a new, secular system for the registration of births, deaths, and marriages. Registration data were compiled and reported annually by the General Register Office, and it is from the tenth through the thirty-third of these *Reports* (1849-72) that I obtain the number of deaths in each union in each year between 1847 and 1870. I obtain the population, the percent of adults working in agriculture, the area in acres, and the names of the constituent parishes of each union in 1841, 1851, 1861, and 1871 from *Decennial Census Reports* (1841-71). I obtain the political affiliation, the proportion of acreage that consisted of water (i.e., harbors, creeks, rivers, etc.), the proportion of population that fell under the jurisdiction of a municipal government, and indicators for whether coal or cotton-textiles were "special occupations" of each union from the *Census Report* of 1851.[6] Political affiliation is defined as the proportion of the members of Parliament representing each union that belonged to a conservative political party in 1852 according to the *Guide to the House of Commons* (1857). I obtain the per capita welfare expenditure of each union from the *Fourth Annual Report of the Poor Law Board* (1851). Welfare expenditure is defined as the amount "expended for in-maintenance, for out-relief, and for other expenses of or immediately connected with [the English Poor Law]." I obtain the rateable value (i.e., property wealth) of each union in the years 1856 and 1868 from the *Return of the Gross Estimated Rental Property* (1861) and the *Return of Rateable Value* (1869), respectively. Lastly, I obtain measures of the religiosity and the religious affiliation of the inhabitants of each union from the *Religious Supplement to the Census* of 1851. I define religios-

[6]Neither the boundaries of parliamentary constituencies nor the boundaries of municipal boroughs matched the boundaries of poor law unions. See the Data Appendix for the method by which I match these areas to one another.

ity as the percent of population that attended any church service on March 30th, 1851. I define religious affiliation as the percent of church sittings that were non-conformist (i.e., non-Anglican Protestant) in 1851.

The Local Board of Health. The Public Health Act of 1848 introduced an additional administrative subdivision—the local board of health—atop of the existing network of parishes and unions. Local board districts were defined as the parishes or parts of parishes of which they were made up, and were neither constrained nor informed by the boundaries of unions. There was, therefore, only coincidental geographical agreement between the administrative subdivision within which mortality statistics were reported (i.e., the union) and the administrative subdivision for which mortality reduction was the raison d'être (i.e., the local board of health). I match the two administrative subdivisions in the following way. First, I obtain the population, the adoption date, and the names of the parishes partly or wholly within the districts of each local board of health adopted between 1848 and 1866 from the *Return of Local Boards* (1868).[7] Second, I match the parishes partly or wholly within the districts of each local board of health to the union or unions to which they belonged. Third, I determine the fraction of each union's population that fell within the jurisdiction of a local board in every year between 1848 and 1866. I then characterize each union by (*i*) the extent to which it was "treated" by the adoption of a local board of health and (*ii*) the year in which this "treatment" occurred. The Wallingford Poor Law Union, for example, consisted of 29 parishes, five of which combined to form the Wallingford Local Board of Health in 1863. These five parishes (i.e., Allhallows, St. Leonard, St. Mary-the-More, St. Peter, and Wallingford Castle) accounted for 31.5 percent of the Wallingford Union's population. I therefore consider the

[7]This *Return* also enumerates the area in acres and the rateable value of each of these local boards.

Wallingford Poor Law Union to have been 31.5 percent treated, beginning in 1863, by the Public Health Act. Panel C of Figure 1.5 plots the boundaries of each of the three local boards of health adopted between 1848 and 1866 in the country of Berkshire.

Throughout the remainder of the essay I use the union-year as my unit of observation. It is therefore necessary to (*i*) *merge* boards adopted in the same union in the same year and (*ii*) *divide* boards that crossed union boundaries.[8] These modifications yield 444 board adoptions in 272 distinct unions between 1848 and 1866. Of these 272 adoption unions, about two-thirds (176 unions) experienced only one board adoption and about one-third (96 unions) experienced more than one board adoption during this period. The remaining 304 unions did not adopt a local board of health. Figure 1.6 plots the distribution of board adoptions per union. Figure 1.7 demonstrates that the diffusion of local boards of health across England was gradual and, even by 1866, far from comprehensive—in that year, only 26.6 percent of England's population and 19.7 percent of England's rateable value fell under the jurisdiction of a local board of health.

I exclude two types of unions from my dataset. First, I exclude all 27

[8]Here I give two examples. The first example demonstrates board-merging. Two boards were adopted in the Altrincham Union in 1863: the Lymm Local Board on March 6th, consisting of the 3,750-person parish of Lymm, and the Hollingworth Local Board on December 7th, consisting of the 2,300-person parish of Hollingworth. I consider these as one 6,050-person board. The second example demonstrates board-dividing. The Kingston-upon-Hull Local Board, adopted in 1851, consisted of the entirety of the 55,000-person Kingston-upon-Hull Union as well as the 2,000-person parish of Drypool, the 2,000-person parish of Garrison Side, the 27,000-person parish of Sculcoates, the 2,000-person parish of Southcoates, and the 8,000-person parish of Sutton in the Sculcoates Union. I consider this as two boards—one 55,000-person board in the Kingston-upon-Hull Union and another 41,000-person board in the Sculcoates Union. Since local boards were disproportionately adopted in high-population areas, and since unions were typically "arranged in a circle, taking a market town as [their] centre, and comprehending those surrounding parishes whose inhabitants [were] accustomed to resort to the same market," it was relatively rare for a local board to cross union boundaries. See [3] and [67, p. 4].

metropolitan London unions since metropolitan London was excluded from the Public Health Act.[9] This leaves 549 total unions and 272 adoption unions. Second, I exclude all 20 unions within which at least one local board was adopted between 1867 and 1870. Although I observe where these boards were adopted, I do not observe their exact adoption date, and therefore cannot characterize the post-adoption period of their corresponding unions with any precision.[10] This leaves 529 total unions and 252 adoption unions, each of which has a well-defined post-period through 1870.

Table 1.3 presents summary statistics for all of England, for England excluding metropolitan London, for adoption unions, and for adoption unions that remain in my sample. I find that adoption unions tended to be somewhat poorer, less agricultural, less conservative, and more likely to produce coal or cotton-textiles. A comparison of the second and third columns of Table 1.3 shows that the exclusion of the 20 unions within which a local board of health was adopted between 1867 and 1870 does not significantly alter the composition of unions in my dataset. Likewise, a comparison of the fifth and sixth columns of Table 1.3 shows that this exclusion does not significantly alter the composition of boards in my dataset.

1.2.2 The General Board of Health

In order to oversee the adoption of local boards of health, the Public Health Act established a national, three-member General Board of Health, equipped

[9] It was believed that metropolitan London "required special legislation because of its size" [50, p. 590]. This legislation consisted of the Metropolitan Commission of Sewers Act of 1848 and the Metropolis Management Act of 1855.

[10] Board adoptions between 1867 and 1870 are enumerated in the *Return of Number & Names of Local Boards* (1870).

this Board with a veritable army of clerks, servants, and inspectors, and defined the precise procedure by which a "city, town, borough, parish, or place" could adopt a local board. Since the language of the Act did not require that the boundaries of boards conform to or lie within any other boundary, a board of any size could be adopted anywhere, no matter how small or large, how compact or straggling. Adoption, furthermore, could be *voluntary* or *involuntary*, at least in principle. Voluntary adoption required a petition containing the signatures of at least 10 percent of the inhabitants rated to the relief of the poor in a particular area. Involuntary adoption required an imposition by the General Board. If the General Board ascertained that the death rate in a particular area exceeded 23 per 1,000 persons for a period of no less than seven years, then it was authorized to impose a local board upon an area without the consent of its inhabitants.[11] In practice, however, local boards were rarely, if ever, imposed on areas "without substantial local enthusiasm" [50, p. 590]. Since sanitary improvements were undertaken at the discretion of the boards themselves, any attempt to impose a board on an area disinclined to sanitize itself would accomplish nothing. The General Board could impose adoption but could not compel action.

My data corroborate this point. By 1855, at least one local board was adopted in only 55 of the 120 non-London unions within which the average death rate between 1847 and 1853 exceeded 23 per 1,000 persons. In only 12 of these 55 adoption unions did this adoption occur in 1854 or 1855, when the mortality statistics of the entire seven-year period would have been known to the General Board. These approximate proportions hold for every seven-year period

[11]This provision, "in effect, set a mortality rate, the then national average, as a minimum standard of health and as an administrative cue to permit action by the central health authority" [37, p. 340].

between 1847 (the first year in which the General Register Office reported mortality statistics at the union level) and 1858 (the year in which the Local Government Act replaced the General Board of Health with the Local Government Act Office, and, in so doing, made the clause in the Public Health Act that authorized the involuntary adoption of local boards inoperative).[12] Thereafter, adoption was entirely optional with inhabitants in both principle and practice.

1.2.3 The Creation and Composition of Local Boards of Health

Both the creation and the composition of local boards of health depended on the geographical boundaries that they took.

Creation. A superintending inspector was sent to every area that petitioned for adoption to assess its general sanitary state and the sanitary state of its inhabitants. If, after inspection, the General Board determined that the Act should be applied "within the same boundaries as those of an [existing] city, town, borough, parish, or place," local board adoption required only an Order in Council (i.e., an order of the Queen acting by and with the advice and consent of her Privy Council). If, however, the General Board determined that the Act should be applied within new boundaries—within boundaries "not being the same as those of an [existing] city, town, borough, parish, or place"—local board adoption required a Provisional Order (i.e., an order by the General Board to be confirmed by Parliament). I find that roughly half of all boards were created by

[12]Originally intended to expire in 1854, after a five-year phase-in period, the General Board was renewed annually four times. These acts of renewal were the Public Health Act of 1854, the General Board of Health Continued Act of 1855, the General Board of Health Act of 1856, and the General Board of Health Act of 1857. The Local Government Act of 1858 abolished the General Board of Health, permitted a counter-petition of 5 percent of an area's inhabitants, and permitted town councils of municipal boroughs to file for adoption directly. See [71, p. 38] and [63, pp. 123-124].

Provisional Order.[13] The boundaries, therefore, of roughly half of all boards did not previously exist for any other administrative purpose.

Composition. Members of local boards were either elected or appointed. If a board's jurisdiction consisted exclusively of a municipal borough (or a part of a municipal borough), then all board members were to be appointed from among the borough's town councilors (by the borough's town council). If a board's jurisdiction consisted of no part of any municipal borough, then all board members were to be elected by ratepayers. If a board's jurisdiction consisted of both a municipal borough (or a part of a municipal borough) as well as other areas, then some board members were to be appointed and some board members were to be elected. This proportion was fixed by the Order in Council or Provisional Order by which the board was created.

The Act, in effect, established a distinct voting scale for each of these two types of local board members. Elected members, on the one hand, were elected directly according to a plural voting scale by which the wealthiest ratepayers were awarded disproportionate electoral influence. Ratepayers could receive up to six votes for property owned and up to six votes for property occupied.[14] Appointed members, on the other hand, were elected indirectly. Municipal voters (called "burgesses") elected town councilors on a one man, one vote basis. Town councilors, in turn, were entitled (if appointed) to serve on local boards of health. The dramatic difference in voting scales for directly- and indirectly-

[13] Among all local boards of health adopted in England and Wales between 1848 and 1858, 45 percent were created by Order in Council, 50 percent were created by Provisional Order, and the other 5 percent were created by Local Acts. Boards created by Local Acts were called improvement commissions. In this essay I do not distinguish between local boards and improvement commissions insofar as these commissions "incorporated parts, at least, of the Public Health Act." See *Return of Districts where PHA is in Force* (1867).

[14] The voting scale used for local board elections was identical to the scale established for the election of Poor Law boards of guardians by the Poor Law Amendment Act of 1844 [59, p. 229].

elected board members generated an asymmetry in power among voting blocs that varied with the location of the board. The plural voting scale used to elect board members in non-municipal areas concentrated power in the hands of the *haute bourgeoisie*. The singular voting scale used to elect town councilors in municipal boroughs concentrated power in the hands of the *petite bourgeoisie*, who were more numerous than their wealthier counterparts and still wealthy enough to qualify for the franchise. Table 1.4 provides a side-by-side comparison of who, precisely, qualified for the franchise in local board and municipal elections.

Szreter (1997) argues that this asymmetry effectively countermanded the Public Health Act—that the domination of a unified (and uniquely parsimonious) *petite bourgeoisie* over municipal politics obstructed urban sanitation efforts until the Municipal Franchise Act of 1869 extended the municipal franchise to the upper tier of the working class, whereupon the stranglehold of the so-called "shopocracy" was broken [106]. The evidence that I present in this essay, however, contradicts this argument. First, I find that the reach of municipal politics was limited. In 1851, municipal boroughs contained less than one-quarter of the total English population and less than one-half of the English population living in towns of greater than 2,000 inhabitants. More than 50 towns returning members to Parliament (i.e., parliamentary boroughs) were not regulated by the Municipal Corporations Act of 1835 and, therefore, any local boards adopted within them would not have faced the penny-pinching pressures of an ascendant *petite bourgeoisie*.[15] Figure 1.8, which juxtaposes population density

[15] According to the 1851 Census Report, there were 465 English towns of more than 2,000 inhabitants, 176 of which were municipal boroughs, 52 of which were parliamentary boroughs that were not also municipal boroughs, and 237 of which were neither a municipal nor a parliamentary borough. Therefore, only 37% of all such English towns were regulated by the Municipal Corporations Act of 1835. There were 10,329,249 persons living in these 465 towns (roughly 60 percent of the English population), 4,300,864 of which lived in a municipal borough, 4,743,441

with the location of municipal boroughs by parish, illustrates the scope of municipal boroughs more clearly. Second, I find that there is a positive correlation between the percent of union population that fell under the jurisdiction of a municipal borough in 1851 and the percent of union population that fell under the jurisdiction of a local board of health by 1866, and that this correlation persists even after controlling for differences in population density (see Section 1.3.1 for a more detailed discussion of the determinants of board adoption). If municipal governments and the petite bourgeoisie that they disproportionately represented were, in fact, opposed to the adoption of local boards of health, there is little evidence that they succeeded in their opposition.

If municipal politics did not *deter* local board adoption, what, precisely, *induced* it? Why would the wealthier inhabitants of a given area (i.e., ratepayers) voluntarily pay for the provision of sanitation improvement, and in so doing subsidize the poorer inhabitants (i.e., non-ratepayers), to whom many, if not most, of the benefits of sanitation improvement would accrue? The answer lies in the proximity of the wealthy to the poor. "Close to the splendid houses of the rich," wrote Engels in 1845, "the bitterest poverty [is often] found" [36, p. 28]. Booth (1889) corroborates this point [21]. Figure 1.9 illustrates that behind and adjacent to the middle-class residences that lined the boulevards of London were some of the city's poorest residences. In most English cities of the nineteenth century, there was no enclave to which the rich retreated. Rich and poor lived side-by-side, and the consequences of an outbreak of disease in a city slum would quickly spill over elsewhere. It was in the self-interest of the wealthy ratepayer to prevent this from happening. The next section describes

of which lived in a parliamentary borough that was not also a municipal borough, 146,639 of which lived in a parliamentary borough that was also a municipal borough but outside of the boundaries of the municipal part, and 1,138,305 of which lived in a town that was neither a municipal nor a parliamentary borough.

the means by which local boards of health could do so.

1.2.4 The Powers of Local Boards of Health

Once formed, local boards were required to hold meetings at least once a month and to appoint Inspectors of Nuisances to investigate industrial emissions, unsanitary dwellings, and accumulations of refuse and sewage, among other things. Local boards were also encouraged to appoint legally qualified medical practitioners as Officers of Health, though "what such officers [were] to do remained vague" [50, p. 590].[16] In what follows, I divide the powers endowed to local boards by the Public Health Act into four broad categories: (*i*) *large capital outlays*, (*ii*) *small capital outlays*, (*iii*) *regulations*, and (*iv*) *revenues*.

Large Capital Outlays. This category contains two classic public health expenditures: sewers and waterworks. Edwin Chadwick, the architect of the Public Health Act, "had envisaged every urban house connected to both a clean water supply and to a waterborne mains sewerage system" [106, p. 708]. Though the realization of this vision took more than a few decades, its seed was sown in 1848. Boards could construct, repair, enlarge, redirect, clean, or empty sewers as they saw fit. All sewers, "whether existing or made at any time thereafter," were to be "entirely under the management and control of the local board of health."[17] Likewise, boards could construct waterworks "to provide their district with such a supply of water as [was considered] proper and sufficient," so long as no for-profit company was willing to do the same. If necessary, boards

[16] All questions were to be decided by a majority vote of local board members during these meetings.

[17] An exception was made for sewers "made by any person or persons for his or their own profit." Nevertheless, boards were authorized to "purchase or contract for the use of any such sewers."

were authorized to "purchase, take upon lease, sell, or exchange any lands or premises" within their districts.

Small Capital Outlays. This category contains less ambitious but more immediate infrastructure improvements. Public streets could be "swept, cleansed, and watered" by local boards, and any "dust ashes, rubbish, filth, dung, or soil thereon" could be "collected and removed." Boards could pave, re-pave, repair, channel, level, or otherwise alter any street in order to minimize fetid standing water. Boards could also provide and maintain "boxes for the temporary deposit or collection of rubbish" and "waterclosets, privies, or other similar conveniences for public accommodation."

Regulations. Boards could require the registration of houses, businesses, or other individuals in order to ensure compliance with regulations—or bye-laws—that they passed. Once passed, bye-laws would be circulated in at least one newspaper in the district for at least one month prior to their official adoption, after which time they would be printed and hung in the office of the local board. Bye-laws oversaw a number of activities and business entities. Among them were the following.

> *New Construction*. The builder of any house was required to report to the local board the "intended level of the lowest floor" and the "situation and construction of any privies or cesspools" at least fourteen days before groundbreaking. It was unlawful to build or re-build a house without "a covered drain for proper and effectual drainage," and if the house was within one-hundred feet of a public sewer, its drain was required to communicate with it.

Lodging Houses. It was unlawful for landlords to let "cellars, vaults, or underground rooms" that were "ineffectually drained," less than seven feet in height, or less than three feet in "height above the surface of the street or ground adjoining." Occupancy, ventilation, and sanitation standards were to be set by local boards.

Offensive Trades. Inspectors of nuisances were authorized to enter any slaughterhouse "at all reasonable times" in order to dispose of "unfit meat." Likewise, any "blood boiler, bone boiler, or other noxious or offensive business, trade or manufacture" was subject to periodic inspection.

Burial Grounds. If it was determined that a graveyard was "in such a state as to be dangerous to the health of the persons living in the neighborhood thereof, by reason of the surcharged state of the vaults or graves," and that "sufficient means of interment [existed] within a convenient distance," it was made unlawful to "bury any further corpses or coffins within it."

Other. Any undue accumulation of "waste, stagnant water, manure, dung, soil, or filth, or any other offensive or noxious matter" was prohibited. More generally, if a house was kept "in such a filthy or unwholesome condition that the health of any person [was] affected or endangered thereby," the local board could require that the owner or occupier of the house "whitewash, cleanse, or purify the same." Lastly, manufacturers were liable to penalty (and would incur the cost of the examination) if they were found to have "fouled" any "stream, reservoir, conduit, aqueduct, or other waterwork." By-products of gasworks manufactures were singled out by the language of the Act.

Revenues. Boards had access to two types of property taxes—the "general district rate" and the "special district rate," intended to defray short- and long-term expenditures, respectively—and boards could borrow on the security of either tax. Debt was necessary to finance lumpy public works projects that could not be built "bit by bit out of annual income" [49, p. 278]. The Exchequer offered subsidized loans for this purpose, subject to the approval, after inspection, of the General Board. Of relatively minor importance were fines and private improvement rates collected from offenders of bye-laws. Fine amounts were set at the discretion of local boards, though they could not exceed £5 per offense, and in the case of a continuing offense any additional penalty could not exceed forty shillings for each day after written notice. Private improvement rates were reimbursements made to boards by non-compliant individuals for any improvements undertaken by boards on their behalf. Lastly, private water rates might be levied "in respect of water supplied to private properties" in proportion to the "net annual values of the premises."

To what extent did boards actually *exercise* these powers? The literature suggests that they did so sparingly, only when it benefited industry, or not at all.[18] My claim is twofold. First, boards that did not spend with abandon need not have been inactive or ineffective. Regulation was such that disobedient indi-

[18]Rosen (1958) claims that "even the most elementary proposals for the improvement of drainage and water supplies were opposed [by vested interests] in the sacred names of property and human freedom" [97, p. 125]. Hassan (1985) and Szreter (1997) emphasize that "the significance of water as an industrial raw material was often the primary consideration, with commercial demand consuming in many cases half of the extra urban water supply capacity created after 1848" [53, p. 540]. Only when "key local businessmen could see a commercial advantage was an initiative taken" [106, p. 708]. Michael (1874) and Lipman (1949) refer to boards adopted "with the express intention of doing nothing under the [Public] Health Acts, but of avoiding liabilities incident to their districts" [83, p. 443]. After the passage of the Highway Act of 1862, for example, parishes feared that "if they were put into a highway district, they would always be paying for the roads in the next parish." Small parishes, therefore, saw a "convenient loophole." Since local board of health districts retained control of their own highways, "these small parishes rushed to acquire the status of local boards, with no intention in fact of ever building a sewer or providing a drain" [67].

viduals, households, or businesses—not district ratepayers—bore the cost of improvement. Furthermore, even trivial expenditures may well have yielded nontrivial improvements given the abysmal state of nineteenth century sanitation. Second, boards *were* spending. The *Return of Local Boards of Health* (1857) and the first through twelfth *Annual Reports of the Home Secretary* (1858-70) reveal that more than £7 million were borrowed by local boards from the Exchequer between 1848 and 1870. This amounts to approximately $805 million in 2017 U.S. dollars.[19] Since I observe neither loans secured by local boards from private sources nor direct expenditures by local boards from out of general, private improvement, or private water rates, I interpret loans secured by local boards from the Exchequer as a lower bound for public health expenditures.

Table 1.5 illustrates these data in greater detail, by location and by type of borrowing. Somewhat surprisingly, I find that debt was neither limited to nor concentrated in industrial areas. On the contrary, local boards in unions that specialized in coal or cotton-textile production borrowed slightly less per person than did the average board between 1848 and 1870. Furthermore, nearly 62 percent of all borrowing by local boards between 1858 and 1870 was earmarked for what I have called ”large capital outlays” (i.e., drainage, water supply, land purchases, and other permanent works).

[19] See [88] for conversion.

1.3 Empirical Analysis

1.3.1 Model

My empirical strategy exploits two dimensions of variation—(*i*) the *timing* of local board adoption and (*ii*) the *share* of union population under the jurisdiction of a local board—in order to identify the effect of local boards on mortality rates. Figure 1.10 illustrates the first dimension of variation. There were two ill-defined waves of local board adoption: one in the early 1850s and another in the early-to-mid 1860s. Figure 1.11 illustrates the second dimension of variation. The share of union population under the jurisdiction of a local board varied widely, from 1.5 to 100 percent among adoption unions, but the vast majority of local boards accounted for less than half of the population of the union within which they were adopted. I estimate an event study model that accommodates both of these dimensions of variation. Formally, I estimate the following equation.

$$\begin{aligned} \mathrm{DR}_{ut} = \beta_0 + & \sum_{j=-4}^{j=-2} \pi_j \cdot \mathbf{1}(\mathrm{EY}_{ut} = j) \cdot \mathrm{BFRAC}_{u,j=0} \\ & + \sum_{j=0}^{j=4} \pi_j \cdot \mathbf{1}(\mathrm{EY}_{ut} = j) \cdot \mathrm{BFRAC}_{ut} \\ & + \beta_1 \mathrm{BFRAC}_{ut} + \beta_2 \mathbf{X}_{ut} + \eta_u + \gamma_t + \epsilon_{ut} \end{aligned} \tag{1.1}$$

The subscript u indexes unions (from 1 to 522) and the subscript t indexes years (from 1847 to 1870). DR_{ut} is the crude death rate in union u in year t and $\mathbf{X}_{ut}$ is a vector of time-varying union-specific covariates that includes population density, rateable value per capita, and percent of adults employed in agriculture.

EY_{ut} is the number of years (as of year t) since the *first* board adoption in union u (i.e., event years). I set EY_{ut} equal to -4 for all event years less than or equal to -4 and to 4 for all event years greater than or equal to 4. $BFRAC_{ut}$ is the share of union u's population that fell under the jurisdiction of a local board of health in year t. $BFRAC_{u,j=0}$ is the share of union u's population that fell under the jurisdiction of the *first* local board of health adopted within union u (i.e., the share of union u's population that fell under the jurisdiction of a local board of health in event year $j = 0$). For unions within which no local board of health was adopted between 1848 and 1870, $BFRAC_{ut} = BFRAC_{u,j=0} = 0$ for all t. For unions within which only one local board of health was adopted between 1848 and 1870, $BFRAC_{ut} = BFRAC_{u,j=0} > 0$ for all event years $j > 0$. For unions within which more than one local board of health was adopted between 1848 and 1870, $BFRAC_{ut}$ exceeds $BFRAC_{u,j=0}$ in some event years $j > 0$ in order to account for the effect of subsequent board adoptions on mortality. η_u are union fixed-effects. These control for any fixed differences in death rates across unions. γ_t are year fixed-effects. These control for any England-wide trends in death rates. ϵ_{ut} is an error term. All variables except EY_{ut}, $BFRAC_{ut}$, and $BFRAC_{u,j=0}$ are in logarithms, each union-year observation is weighted by population, and standard errors are clustered at the union level in order to account for within-union serial correlation.

The coefficients of interest are the set of π_j. I interpret these as the flexibly estimated pattern of death rates in adoption unions relative to non-adoption unions, accounting for differences in board-share (i.e., $BFRAC_{ut}$) among adoption unions. I suppress π_{-1}, therefore each π_j for all $j \neq -1$ is measured relative to the year before the year of first board adoption. This amounts to normalizing π_{-1} to β_1—the estimated difference in death rates between adoption and

non-adoption unions that is independent of event-time, again accounting for differences in board-share among adoption unions. Since Equation 1.1 does not privilege any one event year over another, a downward break in the trend of this pattern at $j = 0$ would indicate that local board adoption did, in fact, reduce mortality. A pattern without a trend break, or with a trend break that occurs either before or after $j = 0$, would indicate that local board adoption played an insignificant role in English mortality trends between 1848 and 1870.

Because of the possibility that boards were adopted when, where, and to the extent that they were adopted because mortality was worsening, I follow Finkelstein (2007) and interpret the *change* in relative mortality trends before and after adoption as my estimate of the impact of the adoption of a local board of health [41]. Formally, I calculate $\tilde{\pi}_j$, the *cumulative* mortality effect of the adoption of a union-wide local board of health j years after adoption, using my estimates of π_j from Equation 1.1:

$$\tilde{\pi}_j = \hat{\pi}_j - \frac{j+1}{3}(\hat{\pi}_{-4}) \text{ for } j \in \{0, 1, 2, 3, 4\} \tag{1.2}$$

This amounts to measuring all post-adoption estimates of π_j against the relative pre-trend defined by the line formed between the points $(-4, \hat{\pi}_{-4})$ and $(-1, \hat{\pi}_{-1})$, where the first coordinate refers to event year and the second coordinate refers to estimated percent mortality change. I also calculate the *incremental* mortality effect of the adoption of a union-wide local board of health in the jth year after adoption by subtracting $\tilde{\pi}_{j-1}$ from $\tilde{\pi}_j$ for all $j > 0$. I calculate standard errors using the delta method.

This interpretation (and my empirical strategy more generally) relies on

three main assumptions. First, I assume that the variation that I observe in the timing and extent of local board adoption across unions is largely idiosyncratic, and *not* simply an artifact of pre-Public Health Act differences in union characteristics that might themselves be correlated with mortality. Despite that I control for many of these characteristics (either explicitly or implicitly using union fixed-effects), there remains the possibility that the relationship between these characteristics and the timing and/or extent of local board adoption is nearly deterministic, leaving little exogenous variation with which to identify Equation 1.1. Since board adoption was, for all intents and purposes, voluntary with the taxpayers in a given area, this possibility is of genuine concern. In order to test for this, I use various pre-Public Health Act union characteristics to predict (*i*) whether unions adopted local boards of health, (*ii*) the extent to which unions adopted local boards of health, and (*iii*) the year in which unions adopted local boards of health. Formally, I estimate the following equations:

$$\text{BOARD}_u = \alpha_0 + \alpha_1 \text{PRECHARACTERISTICS}_u + \epsilon_u \tag{1.3}$$

$$\text{BFRAC}_{u,1866} = \delta_0 + \delta_1 \text{PRECHARACTERISTICS}_u + \epsilon_u \tag{1.4}$$

$$\text{ADOPTYEAR}_u = \mu_0 + \mu_1 \text{PRECHARACTERISTICS}_u + \epsilon_u \tag{1.5}$$

I define BOARD_u as a dummy that takes a value of 1 if any portion of union u fell under the jurisdiction of a local board of health by 1866, $\text{BFRAC}_{u,1866}$ as the fraction of union u's population that fell under the jurisdiction of a local board of health by 1866, ADOPTYEAR_u as the year of first local board of health adoption in union u, and $\text{PRECHARACTERISTICS}_u$ as a vector of union-specific characteristics that includes the mortality rate in 1847, the population growth rate between 1841 and 1851, population density in 1847, the percent of adults working

in agriculture in 1847, dummies for whether coal or cotton-textiles were "special occupations" in 1851, the proportion of acreage that consisted of water (i.e., harbors, creeks, rivers, etc.) in 1851, rateable value per capita in 1847, welfare expenditure per capita (used here as a proxy for poverty) in 1851, and the proportion of population that fell under the jurisdiction of a municipal borough in 1851.[20]

Tables 1.6 and 1.7 report the results of Equations 1.3, 1.4, and 1.5. I find that less agricultural, less dense, and less impoverished unions were more likely to adopt a local board of health; that less agricultural and less dense unions within which population was growing more quickly and a greater share of population was under the jurisdiction of a municipal borough were more likely to adopt a *bigger* local board of health (as a percentage of population); and that richer and less agricultural unions with higher rates of initial mortality were more likely to adopt a local board of health *earlier*.[21] Nevertheless, the quantitative importance of these predictors is small. More than 74 percent of the variation in BOARD_u, more than 66 percent of the variation in $\text{BFRAC}_{u,1866}$, and more than 88 percent of the variation in ADOPTYEAR_u remains unexplained by $\text{PRECHARACTERISTICS}_u$. I interpret the weakness of the fit of these models as evidence of the strength of my identification strategy. Put differently, the vast majority of the variation in both the timing and extent of board adoptions across unions appears to be idiosyncratic—a consequence, for instance, of variation in the capacity to act collectively, as opposed to variation in mortality-related en-

[20]Data limitations require that I draw some "pre"-characteristics from the 1851 Census Report, despite that these characteristics (i.e., coal and cotton-textile dummies, percent water, and percent municipal borough) are measured three years after the Public Health Act was passed.

[21]The (counterintuitive) correlation between population density and board adoption is a consequence of a small number of very populous unions within which no board, or only a very small board, was adopted. When log(density) is included in lieu of density, the direction of this correlation is reversed.

vironmental or social conditions.

Second, I assume that relative mortality trends before board adoption would have continued into the post-adoption period had no local boards of health been adopted (i.e., the mortality rate in adoption unions would have continued to worsen at the same rate relative to the mortality rate in non-adoption unions had the Public Health Act not been passed). This assumption is implicit in Equation 1.2.

Third, I assume that that there are no unaccounted-for changes within unions over time that affected mortality and occurred contemporaneously with board adoption. I address three potentially confounding factors: (*i*) *shifts in age distributions*, (*ii*) the *Lancashire Cotton Famine*, and (*iii*) *deaths in public institutions*.

Shifts in Age Distributions. Mortality rates are extremely sensitive to the percentage of the population that is either very old or very young. Between 1841 and 1871, 65- to 74-year-olds died at roughly three times the rate of the English population as a whole, and infants died at more than twice the rate of 65- to 74-year-olds [81, p. 100]. Consequently, unions with disproportionately tail-heavy age distributions had, ceteris paribus, disproportionately high mortality rates. In order to account for the possibility that many unions simultaneously experienced both a board adoption and a change in the share of the population that was either very young or very old, I estimate two alternative specifications of Equation 1.1. The first includes OLD_{ut} and YOUNG_{ut}, where OLD_{ut} is the percentage of union u's population aged greater than 60 in year t and YOUNG_{ut} is the percentage of union u's population aged less than 5 in year t.[22] The second includes AGE_{utb}, a 20-bin age-share spline, where AGE_{ut1} is the percentage

[22]Census reports did not disaggregate infants from 1-, 2-, 3-, and 4-year-olds within unions until 1861.

of union u's population between 0 and 5 in year t, AGE_{ut2} is the percentage of union u's population between 5 and 10 in year t, and so on. Demographic evidence suggests that neither of these alternative specifications will significantly alter my results. Figure 1.12 illustrates that it was not until the end of the nineteenth century that the English age distribution began its shift from a convex to a more familiar concave shape. This shift was the result of a precipitous decline in infant mortality and a slower, more persistent decline in the birth rate.[23]

Lancashire Cotton Famine. In the nineteenth century the United States was England's principal supplier of raw cotton. This commercial relationship was temporarily severed during the American Civil War (1861-65), and England's cotton-textile manufacturing towns fell into a short but severe recession. In order to account for any systematic relationship between board adoption, mortality, and textile manufacturing during these so-called "famine years," I include $(\gamma_t \times \text{COTTON}_u)$, where COTTON_u is an indicator for whether union u specialized in cotton-textile production in 1851, and γ_t, as before, are year fixed-effects.

Deaths in Public Institutions. Deaths were registered where they occurred. It is therefore likely that the *reported* number of deaths overstates the *actual* number of resident deaths in unions with large hospitals, workhouses, or asylums that serviced non-residents. Since any changes in DR_{ut} as a result of the erection, expansion, or demolition of such institutions are mechanical and unexplained by Equation 1.1, any correlation between the timing of these changes and the timing of board adoption will generate a bias in my estimates of π_j. Although there is no comprehensive record of deaths in public institutions at the union level until 1869, the evidence that does exist suggests that the number of, and

[23]See *Decennial Census Reports* (1841-1921) and *Annual Reports of the Registrar-General* (1841-1921).

the percentage of deaths in, public institutions changed minimally between 1851 and 1870. Figure 1.13 demonstrates that my sample predates the era of public institution-building in London. Insofar as London's experience reflects the experience of England as a whole (as it did between 1870 and 1900), it is unlikely that hospitals, workhouses, or asylums played even a peripheral role in determining changes in union death rates prior to 1870.

1.3.2 Results

Table 1.8 reports the results of Equation 1.1. The first column reports the basic specification, the second column includes OLD_{ut} and YOUNG_{ut}, the third column includes $(\gamma_t \times \text{COTTON}_u)$, the fourth column includes region-by-year fixed-effects (my preferred specification), and the fifth column includes AGE_{utb}. In each of these specifications the pattern of $\hat{\pi}_j$ over event time exhibits a clear and considerable trend break in the year of board adoption (i.e., $j = 0$). Figure 1.14 plots this pattern. The upward-sloping pre-trend implies that mortality was worsening in adoption unions relative to non-adoption unions in the years preceding adoption. This is unsurprising, since unions experiencing the greatest deterioration in their sanitation conditions would have had the greatest incentive to improve their sanitation conditions. The downward-sloping post-trend implies that mortality was improving in adoption unions relative to non-adoption unions in the years following adoption.

I transform these estimates of π_j into estimates of the effect of local board adoption on mortality using Equation 1.2. Table 1.9 reports the results of this calculation. The first row reports the *cumulative* effect of local board adoption

on the mortality rate zero, one, two, three, and four years after adoption (i.e., $\tilde{\pi}_0, \tilde{\pi}_1, \tilde{\pi}_2, \tilde{\pi}_3, \tilde{\pi}_4$). These estimates suggest that the adoption of a union-wide local board of health would have reduced mortality by 2.5 percent in the year of adoption, 7.3 percent after one year, 10.7 percent after two years, 12.0 percent after three years, and 14.2 percent after four years. This amounts to 34, 49, 55, and 65 fewer deaths one, two, three, and four years after adoption, respectively, in a union of 20,000 people with an average mortality rate (i.e., 23 deaths per 1,000 population). The second row reports the *incremental* effect of local board adoption on the mortality rate in the year of adoption and in the first, second, third, and fourth post-adoption years (i.e., $\tilde{\pi}_0 - 0, \tilde{\pi}_1 - \tilde{\pi}_0, \tilde{\pi}_2 - \tilde{\pi}_1, \tilde{\pi}_3 - \tilde{\pi}_2, \tilde{\pi}_4 - \tilde{\pi}_3$). These estimates suggest that the effect of the adoption of a local board of health was greatest in the first and second full years after adoption.

Figure 1.15 reports the implied effects of local board adoption on the aggregate English mortality rate between 1848 and 1870, accounting for the proportion of the English population that fell under j-year-old boards in each year. Since boards were limited to less than one-fourth of the English population before 1865, less than one-sixth of the English population before 1860, and less than one-tenth of the English population before 1851, these implied England-wide effects are muted in comparison with the direct effects of local boards, but are still quite large. In 1870, for instance, my estimates suggest that the aggregate English mortality rate was 3.7 percent lower than it would have been had the Public Health Act not been passed. Since there were approximately 525,000 total deaths in England in 1870, this implies that approximately 20,000 lives were saved in 1870 as a result of local board adoption. Repeating this exercise for each year between 1848 and 1870, I calculate that 227,598 lives were saved as a result of the Public Health Act. Figure 1.16, which plots the *actual* English mor-

tality rate alongside this *counterfactual* English mortality rate, demonstrates that the relative "flatness" of aggregate English mortality prior to 1870 should not be interpreted as prima facie evidence of the ineffectiveness of local boards of health. Furthermore, the mortality gains that local boards of health achieved at the *local* level are no less significant for being nearly indiscernible at the *national* level until the 1860s.

I perform three robustness checks. First, I re-estimate Equation 1.1 excluding all non-adoption unions (i.e., unions within which no local board of health was adopted between 1848 and 1870). The results, reported in Table 1.10, reveal no significant changes. The up-and-down pattern of $\hat{\pi}_j$ over event-time persists, and the implied effect of the adoption of a local board of health on mortality after four years (i.e., $\tilde{\pi}_4$) is only slightly larger than the implied effect from my preferred specification. Second, I estimate a modified, binary-treatment version of Equation 1.1 for which BFRAC_{ut} is replaced by BOARD_u, which is defined as before. Formally, I estimate:

$$\begin{aligned} \text{DR}_{ut} = \beta_0 &+ \sum_{j=-4}^{j=-2} \phi_j \cdot \mathbf{1}(\text{EY}_{ut} = j) \cdot \text{BOARD}_u \\ &+ \sum_{j=0}^{j=4} \phi_j \cdot \mathbf{1}(\text{EY}_{ut} = j) \cdot \text{BOARD}_u \\ &+ \beta_2 \mathbf{X}_{ut} + \eta_u + \gamma_t + \epsilon_{ut} \end{aligned} \tag{1.6}$$

In this way, I identify the effect of the adoption of a local board of health on mortality using only variation in the *timing* of local board adoption. The results, reported in Table 1.11, reveal an attenuated pre- and post-trend in the pattern of $\hat{\phi}_j$ relative to the pattern of $\hat{\pi}_j$. The attenuation of the slope of the pre-trend suggests that the timing of local board adoption is only partly responsible for

the upward slope of $\hat{\pi}_j$ between $j = -4$ and $j = -1$. The attenuation of the slope of the post-trend is the expected result of characterizing both low- and high-share unions as adoption unions, without adjusting for exposure to adoption. Adoption unions for which $\text{BFRAC}_{u,j=0}$ is low were, ipso facto, only nominally affected by the adoption of a local board of health, and hence their inclusion diminishes $\hat{\phi}_0$, $\hat{\phi}_1$, $\hat{\phi}_2$, $\hat{\phi}_3$, and $\hat{\phi}_4$ relative to $\hat{\pi}_0$, $\hat{\pi}_1$, $\hat{\pi}_2$, $\hat{\pi}_3$, and $\hat{\phi}_4$. Third, I re-estimate Equation 1.6 separately for high-share unions and low-share unions. The results, reported in Table 1.12, reveal that the effect of the adoption of a local board of health on mortality is proportional to board share. High-share unions saw greater post-adoption reductions in mortality than low-share unions. This decomposition strongly suggests that the source of the trend-reversal in relative mortality that I observe is board activity.

Lastly, I demonstrate the importance of the disaggregation of event-years that an event study model affords. Since the trend-reversal that I observe in the pattern of $\hat{\pi}_j$ is roughly symmetric about the year before board adoption (i.e., $j = -1$), a simple difference-in-differences model will underestimate the effect of local boards of health on mortality by effectively canceling the post-trend with the pre-trend. More formally, Table 1.13 reports estimates of a difference-in-differences model of the form

$$\begin{aligned} \text{DR}_{ut} = \beta_0 + \pi(\text{BFRAC}_{ut} \times \text{POST}_{ut}) + \beta_1 \text{BFRAC}_{ut} \\ + \beta_2 \mathbf{X}_{ut} + \eta_u + \gamma_t + \epsilon_{ut} \end{aligned} \tag{1.7}$$

alongside estimates of my event study model (as defined in Equation 1.1) with and without year fixed-effects, union fixed-effects, and controls (including population density, rateable value per capita, percent of adults employed in agricul-

ture, percent of population aged less than 5, percent of population aged greater than 60, and region-by-year fixed-effects). I define POST_{ut} as a dummy variable that takes a value of 1 if union u had adopted a local board of health by year t and 0 otherwise. The difference-in-differences estimates range from -0.018 to 0.029, and none of them can be distinguished, statistically speaking, from zero. The corresponding event study estimates reveal that any simple before-after analysis will mischaracterize a trend-reversal as a non-effect.

1.3.3 Cost-Benefit Analysis

In this section, I assess whether the Public Health Act was cost effective. More precisely, I assess whether the statistical value of all lives saved by local boards between 1848 and 1870 exceeded the total expenditure of local boards between 1848 and 1870.[24] Since I observe only board borrowing from the Exchequer, and neither board borrowing from private sources nor board spending, I proceed in the following way. Rather than commit to any one assumption about the relationship between board borrowing from the Exchequer and board spending in order to impute board spending, I ask the following question: Given a range of plausible estimates of the value of a statistical life (VSL), what is the strongest assumption about the relationship between board borrowing from the Exchequer and board spending that I would have to make in order to conclude that the benefits of local boards exceeded the costs?

In Section 1.2.4, I showed that boards borrowed £7,183,431 from the Exche-

[24] This definition of the benefits of the Public Health Act is almost certainly an understatement. It assumes that local boards accrued no other benefits than the statistical value of the lives that they saved. It does not include, for example, the benefit from reductions in non-fatal illnesses or the aesthetic and social benefits of a cleaner environment as a result of the adoption of local boards.

quer between 1848 and 1870 and, in Section 1.3.2, I estimated that boards saved 227,598 lives between 1848 and 1870. If I assume that all money spent by local boards was borrowed from the Exchequer, this implies that local boards cost English taxpayers £31.56 per life saved. If, however, I assume that only half of all money spent by local boards was borrowed from the Exchequer, and that the other half, which I do not observe, was either borrowed from private sources or spent directly from out of various rates, this implies that local boards cost English taxpayers £14,366,862 in total and £63.12 per life saved. In this way, I can trace out a cost-per-life-saved curve that varies inversely with the proportion of total board expenditure that I assume to be borrowed from the Exchequer. Figure 1.17 plots this curve in 2000 U.S. dollars and overlays various modern and historical VSL estimates.[25] The point at which the cost-per-life-saved curve intersects any particular VSL estimate is the break-even point. To the left of this point, estimated costs exceed estimated benefits. To the right of this point, estimated benefits exceed estimated costs.

Figure 1.17 plots four VSL estimates. The first estimate ($7.7 million in 2000 U.S. dollars) is a composite of 46 studies conducted on labor markets in seven developed countries between 1974 and 2001 [109, pp. 19-21, 27-28].[26] The second estimate ($1.2 million in 2000 U.S. dollars) is a composite of seven studies conducted on labor markets in four developing countries between 1993 and 2001 [109, pp. 27-28].[27] The third estimate ($156,000 in 2000 U.S. dollars) is from Kim & Fishback's (1993) study of accident risk among American railroad work-

[25] See [88] for conversion.

[26] I obtain the $7.7 million estimate by calculating the median of 46 separate VSL estimates from the following seven countries: Australia, Austria, Canada, Japan, Switzerland, the United Kingdom, and the United States.

[27] I obtain the $1.2 million estimate by calculating the median of 7 separate VSL estimates from the following four countries: Hong Kong, India, South Korea, and Taiwan. The distinction between "developed" and "developing" is, in this case, arbitrary and irrelevant but for the difference in the average income of the samples used.

ers between 1893 and 1909, perhaps the best available *historical* VSL estimate [61, p. 811]. All three of these estimates likely overstate the true VSL for a typical nineteenth-century English laborer since safety is a normal good, and the average incomes of the samples from which these estimates are drawn are significantly higher than average English incomes between 1848 and 1870 [108, 109]. To account for this, I derive a fourth estimate ($40,000 in 2000 U.S. dollars) from the third estimate using (*i*) the difference in weekly incomes between English agricultural laborers in 1870 and American railroad workers between 1893 and 1909 and (*ii*) an income elasticity of VSL of 0.5.[28]

This fourth VSL estimate intersects the cost-per-life-saved curve at approximately 10 percent of expenditure borrowed from the Exchequer, which implies that local boards would have had to spend 10 times more than what I observe them to borrow from the Exchequer in order for their total expenditure to exceed, in dollar terms, the statistical value of all of the lives that they saved. This is extremely unlikely. The Public Health Act intended the Exchequer to provide a secure source of long-term credit for the costliest of board activities. If, in fact, expenditure on such activities amounted to less than one-tenth of total expenditure, it would mean that local boards spent at least £77 million between 1848 and 1870, or roughly $9 billion in today's U.S. dollars. I therefore conclude that, under reasonable assumptions, local boards not only saved lives, but did so in a cost-effective manner.

[28]See Viscusi & Aldy (2003) for a discussion of "the effects of income on the value of a statistical life" [109, pp. 36-43]. The relationship between VSL and income is calculated using a meta-analysis of VSL estimates and the average incomes of the samples from which these estimates derive. Based on Viscusi & Aldy (2003), 0.5 appears to be a middle-of-the-road estimate of the income elasticity of VSL. I use Bowley's (1898) estimate of the average wage of English agricultural laborers in 1870.

1.4 Conclusion

This essay examines the effect and cost-effectiveness of the sanitation efforts of English local government in the period before 1870. The Public Health Act of 1848 endowed local boards of health with broad powers, including the right to tax, to borrow, to construct infrastructure, to provide services, and to regulate the activities of households, businesses, and other individuals. Contrary to the prevailing view that English local government before 1870 was dominated by a class of penny-pinching petty capitalists, I find that local boards did, in fact, exercise these powers. They borrowed more than £7 million from the Exchequer between 1848 and 1870, about 62 percent of which was dedicated to the purposes of drainage, water supply, land purchases, and other permanent works. Moreover, the regulatory capacity of local boards should have enabled them to effect sanitary improvement at minimal public expense.

I estimate that the adoption of a union-wide local board of health is associated with a 14.2 percent decrease in the mortality rate after four years. Accounting for incomplete board take-up, this implies that England's mortality rate in 1870 was 3.7 percent lower than it would have been had no local boards been adopted in the preceding 23 years. I calculate that more than 225,000 lives were saved between 1848 and 1870, nearly ten times the number of British casualties during the Crimean War. A back-of-the-envelope comparison of cost per life saved with relevant VSL estimates suggests that the benefits of local board adoption exceeded the costs under all but the most extreme assumptions about the relationship between board borrowing and board spending.

More generally, this essay offers clear quantitative evidence of the capacity

of public health interventions—even interventions that are decentralized and effectively voluntary with local taxpayers—to reduce mortality amidst industrialization. That English mortality was not increasing between 1848 and 1870, as it may have been under the then-uncharted pressures of rapid industrialization, is at least in part a consequence of the adoption of local boards of health. By extension, the precipitous decline in English mortality between 1870 and 1900 might be seen as a consequence of the Public Health Acts of 1872 and 1875, in effect expansions of and extensions to the Public Health Act of 1848. The former subdivided the whole of England into a geographically exhaustive network of rural and urban sanitary districts not unlike local boards. The latter made mandatory many of the provisions of the Act of 1848 that had been voluntary for local boards. All told, the large effects that I find should serve as some encouragement to developing countries experiencing similarly high rates of industrialization, urbanization, and population growth.

1.5 Tables & Figures

Table 1.1: "Turning Points" in GDP per Capita & Life Expectancy at Birth

	Approximate Turning Point (TP)	Level In Year of Turning Point	*Change in Half-Century* †	
			Before TP	After TP
Panel A. GDP per Capita (*1990* $)				
England & Wales	1820	1,756	0.4	1.3
Sweden	1850	1,289	0.2	1.3
France ††	1820	1,218	0.3	0.9
Japan	1870	741	0.1	1.7
Brazil	1900	737	0.1	1.7
Panel B. Life Expectancy at Birth (*Years*)				
England & Wales	1871	41.0	3.0	12.0
Sweden	1875	45.4	4.6	17.2
France††	1893	44.9	3.4	20.3
Japan	1923	42.6	5.8	30.8
Brazil	1940	36.7	8.0	28.9

Source: [34].

† In Panel A, these columns refer to the growth rate in real GDP per capita (in percent per year) in the fifty years before and the fifty years after the approximate turning point. In Panel B, these columns refer to the change in life expectancy at birth (in years) in the fifty years before and the fifty years after the approximate turning point.

†† Female-only.

Table 1.2: Declines in Stature During Industrialization

	Decline?	Birth Cohorts	Amount
United Kingdom (Men)	Yes	1820-50	5.4 cm
United Kingdom (Women)	Yes	1835-55	2.5 cm
United States	Yes	1830-90	4.0 cm
France	No		
Netherlands	No		
Sweden	No		
Germany †	Yes	1860-72	2.5 cm
		1879-85	2.0 cm
Australia	Yes	1867-93	3.0 cm
Japan	No		

Source: [102].

† There were two downturns and one upturn in heights among German birth cohorts between 1860 and 1885. There was a downturn of 2.5 cm among German birth cohorts between 1860 and 1872, an upturn of 3.3 cm among German birth cohorts between 1872 and 1879, and another downturn of 2.0 cm among German birth cohorts between 1879 and 1885. The net downturn, therefore, between 1860 and 1885 was 1.2 cm.

Table 1.3: Summary Statistics

	All Unions (1)	Non-Ldn Unions (2)	Adoption Unions (3)	Aptn Uns in Sample (4)	All Boards (5)	Boards in Sample (6)
Deaths per 1,000 (1847)	20.63 (4.302)	22.03 (4.923)	22.98 (4.856)	23.03 (4.919)		
Population Density† (1847)	6.026 (26.255)	1.919 (8.821)	2.087 (5.410)	2.166 (5.601)	3.931†† (8.230)	3.924†† (8.571)
Percent in Agriculture (1847)	23.80 (12.75)	24.87 (12.04)	19.68 (11.51)	19.85 (11.67)		
Coal Dummy (1851)	0.155 (0.362)	0.162 (0.369)	0.232 (0.423)	0.219 (0.414)		
Cotton Dummy (1851)	0.068 (0.251)	0.071 (0.257)	0.114 (0.319)	0.120 (0.325)		
Fraction Water (1851)		0.024 (0.064)	0.031 (0.076)	0.029 (0.070)		
RV per Capita† (1847)	3.794 (1.411)	3.797 (1.359)	3.413 (1.203)	3.467 (1.212)	3.881 (2.059)	3.797 (1.937)
PL Expenditure per Capita (1851)		0.326 (0.646)	0.287 (0.116)	0.292 (0.118)		
Church Attendance (1851)		0.646 (0.173)	0.627 (0.160)	0.630 (0.162)		

Table 1.3: *Cont'd*

	All Unions (1)	Non-Ldn Unions (2)	Adoption Unions (3)	Aptn Uns in Sample (4)	All Boards (5)	Boards in Sample (6)
Fraction Non-Conformist (1851)		0.406 (0.142)	0.446 (0.138)	0.444 (0.139)		
Fraction Conservative (1852)		0.720 (0.330)	0.643 (0.355)	0.648 (0.357)		
Fraction Mun. Borough (1851)		0.152 (0.276)	0.223 (0.316)	0.233 (0.321)		
No. of Unions	576	549	272	252	272	252
No. of Boards	444	444	444	402	444	402

Notes: Columns (1), (2), (3) and (4) report the averages of each variable across all 576 unions in England, across all 549 non-Metropolitan London unions in England, across all 272 adoption unions in England, and across all 252 adoption unions in England within my sample (i.e., excluding the 20 adoption unions within which a local board was adopted between 1867 and 1870), respectively. Columns (5) and (6) report the averages of each variable across all 444 local boards of health adopted between 1848 and 1866 and across all 402 local boards of health within my sample (i.e., excluding the 42 local boards of health adopted within unions excluded from my sample). Standard deviations are reported in parentheses.

† Columns (1), (2), (3), and (4) report the average population density and rateable value capita of unions in 1847. Columns (5) and (6) report the average population density and rateable value per capita of local boards of health in 1861.

†† I do not observe the total area in acres of every local board of health, and therefore cannot calculate the population density of every local board of health. The reported average population density of local boards of health reported in Columns (5) and (6) is missing 39 and 36 observations, respectively.

Table 1.4: Qualifications for Franchise

	Local Board Elections	Municipal Elections
Ratepayer Restriction	Yes	Yes
Pauper Restriction	Yes	Yes
Occupancy Restriction	None†	Occupiers of "Tenements"††
Geographic Restriction	Within 7 Miles of District	Within 7 Miles of Borough†††
Minimum Duration of Residency	None	2.5 Years
Method of Election††††	Voting Papers	Voting Papers
Votes per Voter	Up to 12	1

Notes: The "ratepayer restriction" refers to the requirement that voters possess and/or dwell in property that was assessed for the poor rate, and that this rate was paid in full. The "pauper restriction" refers to the requirement that voters not be in receipt of any form of poor relief during the previous year. The "occupancy restriction" refers to the requirement that voters live in (or do not live in) certain types of residences (e.g., "tenements"). The "geographic restriction" refers to the eligibility of voters residing just outside the boundaries of the local board and/or borough.

† Though there was no minimum occupancy requirement, the working class was for all intents and purposes disenfranchised. First, paupers were ineligible to vote. A considerable number of would-be voters were disqualified on account of accepting alms. Second, non-ratepayers were ineligible to vote. This disqualified those without occupancy (e.g., the homeless), occupiers of un-rated property (e.g., occupiers of the smallest houses/apartments), and occupiers of property for which only the landlord's name appeared in the rate book (e.g., "compound" tenants for whom the landlord tendered the rate). Compound tenants could tender the rate themselves in order to have their names included in the rate book, but "very few" of them troubled to do so since "application had to be made each time a new rate was made, which would entail four or even six claims a year." Third, the votes of tenants and/or employees were in some cases co-opted by malevolent landlords and/or employers via threats of eviction and/or termination. See [8, p. 217] and [59, pp. 63-66].

†† Unlike the occupancy restriction for the parliamentary franchise (£10 per year), the occupancy restriction for the municipal franchise was categorical. Municipal voters (or "burgesses") were defined by the Municipal Corporations Act of 1835 as "all male householders occupying a house, warehouse, counting house, or shop." Then-Prime Minister Russell had rejected an amendment to add the word "tenement," as this, he said, would "admit every place rated even at the lowest possible amount, and thereby entrust the franchise to a class of persons who may not

Table 1.4: *Cont'd*

exercise it in the manner contemplated by the Bill." This omission was repealed by the Municipal Franchise Act of 1869, which expanded the list of qualifying households to include "other buildings." See [59, pp. 55-56, 228-229, 231].

††† The Reform Act of 1832, which adopted the seven-mile geographic restriction for the parliamentary franchise, "did not specify how the seven miles were to be measured. In default of any clear statement, distances were measured as the crow flies." This method of measurement was upheld by the Registration Act of 1843. The Municipal Corporations Act of 1835, however, "stated that [the seven miles] was to be measured by the nearest public road or way by land and water," hence "any new road or canal might at any time extend the municipal limits" (and, in so doing, the municipal franchise). See [59, p. 148].

†††† The secret ballot was not introduced in England until the Ballot Act of 1872, and only then for parliamentary and municipal elections (i.e., it left elections of Poor Law boards of guardians unaffected). Voting papers, to be completed at and collected from voters' homes "in [relative] quiet and seclusion," were an alternative to open declarations of 'yea' or 'nay' on-site at the hustings. Though not strictly "secret"—they could be "examined" by any elector—voting papers in principle circumnavigated the taunts, threats, and intimidation of the "mob." In practice, however, voting papers deprived the disenfranchised among the "mob" of their lone political forum. See [59, pp. 124-125] and [27, p. 203].

Table 1.5: Borrowing by Local Boards (in 1870£)

		Average Annual Loans from Exchequer Per 100 Population				
	Total Sanctions	All England	Local Boards (LBs)	LBs in Cotton Unions	LBs in Coal Unions	LBs in Industrial Unions
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. All Loans, 1848-70						
Total Loans, 1848-57	1,729,295	1.026	10.501	13.181	8.204	12.223
Total Loans, 1858-70	5,454,136	2.356	10.751	6.807	7.152	9.780
Total Loans, 1848-70	7,183,431	1.795	10.690	8.205	7.391	10.346
Panel B. Loans by Purpose, 1858-70						
Drainage, Water Supply	2,729,218	1.179	5.380	2.991	3.946	3.789
Street Cleaning, Paving	1,683,802	0.727	3.319	1.674	1.211	3.899
Purchase of Land, Bldgs.	424,345	0.183	0.837	0.750	0.498	0.911
Plans, Surveying	3,239	0.001	0.006	0.015	0.007	0.009
Purchase of Pub. Offices	49,455	0.021	0.097	0.069	0.096	0.087
Debt Payment	149,872	0.065	0.295	0.000	0.217	0.128
Lighting	12,023	0.005	0.024	0.017	0.018	0.016
Slaughter Houses	5,874	0.003	0.012	0.019	0.020	0.009
Burial Grounds	9,785	0.004	0.019	0.088	0.000	0.036
Pleasure Grounds	10,262	0.004	0.020	0.000	0.009	0.006

Table 1.5: *Cont'd*

	Total Sanctions	Average Annual Loans from Exchequer Per 100 Population				
		All England	Local Boards (LBs)	LBs in Cotton Unions	LBs in Coal Unions	LBs in Industrial Unions
	(1)	(2)	(3)	(4)	(5)	(6)
Erection of Markets	167,747	0.072	0.331	0.175	0.557	0.470
Other Permanent Works	208,513	0.090	0.411	1.008	0.573	0.420
No. of Unions	576	576	272	39	89	143

Notes: Loan data for the years 1848-57 derive from the *Return of Local Boards of Health* (1857) and for the years 1858-70 derive from *Annual Reports of the Home Secretary* (1858-70). Column (1) reports total loans. Column (2) reports average annual loans per 100 Englanders living under the jurisdiction of a local board of health. Columns (4) through (6) report average annual loans per 100 Englanders living under the jurisdiction of a local board of health among only a subset of unions. Column (4) isolates the 39 unions for which cotton-textile production was a "special occupation" according to the 1851 Census Report. Column (5) isolates the 89 unions for which coal production was a "special occupation" according to the 1851 Census Report. Column (6) isolates industrial unions, where "industrial union" is defined as any union in the top quartile of "percent of adults working in industry," again according to the 1851 Census Report.

Table 1.6: Determinants of Board Adoption & Board-Share

	(1)	(2)	(3)	(4)	(5)	(6)
Deaths per 1,000†	0.005	0.003	0.002	0.003	-0.052	-0.031
(1847)	(0.005)	(0.005)	(0.002)	(0.002)	(0.062)	(0.065)
Population Growth Rate†	0.135	0.136	0.116	0.147*	0.028*	0.035**
(1841-51)	(0.144)	(0.145)	(0.067)	(0.068)	(0.012)	(0.013)
Population Density†	-0.01**	-0.011**	-0.006**	-0.006**	0.033	0.043
(1847)	(0.003)	(0.003)	(0.001)	(0.001)	(0.023)	(0.025)
Percent in Agriculture†	-0.013**	-0.014**	-0.009**	-0.009**	-0.031	-0.022
(1847)	(0.003)	(0.003)	(0.001)	(0.001)	(0.037)	(0.038)
Coal Dummy	-0.003	0.042	-0.012	-0.013	0.042	0.038
(1851)	(0.061)	(0.068)	(0.028)	(0.032)	(0.033)	(0.036)
Cotton Dummy	0.042	-0.117	0.096*	0.090*	0.078	0.097
(1851)	(0.082)	(0.094)	(0.038)	(0.044)	(0.046)	(0.053)
Fraction Water	0.320	0.263	0.194	0.189	0.174	0.170
(1851)	(0.317)	(0.325)	(0.147)	(0.152)	(0.161)	(0.166)
RV per Capita†	-0.010	-0.009	0.003	0.002	-0.060	-0.067
(1847)	(0.018)	(0.019)	(0.008)	(0.009)	(0.037)	(0.040)
PL Expenditure per Capita†	-0.522*	-0.209	-0.092	0.039	-0.035	0.007
(1851)	(0.195)	(0.240)	(0.090)	(0.112)	(0.033)	(0.040)
Fraction Mun. Borough	0.148	0.166	0.291**	0.285**	0.237**	0.218**
(1851)	(0.092)	(0.092)	(0.043)	(0.043)	(0.054)	(0.055)

Table 1.6: *Cont'd*

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	BOARD	BOARD	BFRAC	BFRAC	BFRAC	BFRAC
Census Division Dummies		✓		✓		✓
Variables with "†" in Logs					✓	✓
Observations	549	549	549	549	549	549
R-Squared	0.228	0.258	0.428	0.440	0.381	0.399

Notes: Columns (1) and (2) report the results of Equation 1.3, for which the dependent variable is whether or not a local board of health was adopted within the union between 1848 and 1866 (i.e., BOARD). Columns (3), (4), (5), and (6) report the results of Equation 1.4, for which the dependent variable is the share of union population that fell within the jurisdiction of a local board of health by 1866. In Columns (5) and (6) the cross symbol (i.e., "†") denotes that the variable is in logs.

** Significant at the 1 percent level.
* Significant at the 5 percent level.

Table 1.7: Determinants of First Board Adoption Year

	(1)	(2)	(3)	(4)
Deaths per 1,000†	-0.185*	-0.194*	-2.698	-3.018
(1847)	(0.090)	(0.096)	(2.271)	(2.370)
Population Growth Rate†	-2.530	-2.152	-0.764	-0.895
(1841-51)	(2.252)	(2.295)	(0.491)	(0.510)
Population Density†	0.056	0.040	0.047	-0.442
(1847)	(0.086)	(0.087)	(0.974)	(1.058)
Percent in Agriculture†	0.143**	0.161**	1.571	1.306
(1847)	(0.054)	(0.057)	(1.428)	(1.501)
Coal Dummy	1.337	2.135	0.744	1.366
(1851)	(1.036)	(1.204)	(1.110)	(1.284)
Cotton Dummy	1.746	1.107	1.800	1.211
(1851)	(1.310)	(1.542)	(1.476)	(1.709)
Fraction Water	-2.926	-3.604	-0.624	-1.588
(1851)	(5.147)	(5.303)	(5.428)	(5.563)
RV per Capita†	-1.070**	-1.220**	-3.065*	-3.896*
(1847)	(0.401)	(0.432)	(1.418)	(1.537)
PL Expenditure per Capita†	2.711	4.358	0.515	1.096
(1851)	(4.059)	(5.161)	(1.203)	(1.488)
Fraction Mun. Borough	0.630	1.164	0.776	1.502
(1851)	(1.528)	(1.563)	(1.733)	(1.823)
Census Division Dummies		✓		✓
Variables with "†" in Logs			✓	✓
Observations	272	272	272	272
R-Squared	0.080	0.116	0.065	0.113

Notes: Columns (1), (2), (3), and (4) report the results of Equation 1.5. Columns (2) and (4) include regional fixed effects (i.e., census division dummies). In Columns (5) and (6) the cross symbol (i.e., "†") denotes that the variable is in logs.

** Significant at the 1 percent level.

* Significant at the 5 percent level.

Table 1.8: Effect of LBs of Health on Mortality

	(1)	(2)	(3)	(4)	(5)
BFRAC × EY=-4	-0.066*	-0.065*	-0.064*	-0.052*	-0.053*
	(0.031)	(0.030)	(0.029)	(0.026)	(0.023)
BFRAC × EY=-3	-0.055*	-0.055*	-0.057*	-0.040	-0.041
	(0.027)	(0.027)	(0.025)	(0.022)	(0.022)
BFRAC × EY=-2	-0.023	-0.023	-0.026	-0.023	-0.023
	(0.032)	(0.033)	(0.032)	(0.029)	(0.029)
BFRAC × EY=0	-0.022	-0.022	-0.023	-0.008	-0.5007
	(0.023)	(0.023)	(0.023)	(0.025)	(0.025)
BFRAC × EY=1	-0.049	-0.049	-0.046	-0.038	-0.038
	(0.026)	(0.026)	(0.024)	(0.024)	(0.024)
BFRAC × EY=2	-0.060*	-0.060*	-0.062*	-0.055*	-0.056*
	(0.028)	(0.028)	(0.025)	(0.025)	(0.025)
BFRAC × EY=3	-0.055*	-0.055*	-0.062*	-0.051*	-0.051*
	(0.026)	(0.026)	(0.024)	(0.025)	(0.025)
BFRAC × EY=4	-0.059*	-0.057*	-0.059**	-0.056*	-0.056*
	(0.025)	(0.025)	(0.023)	(0.023)	(0.023)
BFRAC	0.184**	0.195**	0.166**	0.143**	0.160**
	(0.049)	(0.048)	(0.044)	(0.047)	(0.047)
Log RV per Capita	0.090**	0.083**	0.085**	0.094**	0.095**
	(0.035)	(0.031)	(0.031)	(0.035)	(0.034)
Log Population Density	-0.119	-0.163	-0.160	-0.159	-0.176*
	(0.069)	(0.083)	(0.084)	(0.085)	(0.087)

Table 1.8: *Cont'd*

	(1)	(2)	(3)	(4)	(5)
Log Percent in Agriculture	-0.044	-0.025	-0.020	-0.017	-0.015
	(0.030)	(0.027)	(0.027)	(0.027)	(0.025)
Log Percent Under 5 Years		-0.051	-0.052	-0.044	
		(0.042)	(0.042)	(0.039)	
Log Percent Over 60 Years		-0.184*	-0.195*	-0.191*	
		(0.083)	(0.083)	(0.083)	
Cotton × Year FEs			✓	✓	✓
Census Division × Year FEs				✓	✓
Twenty-Bin "Age Share" Spline					✓
Observations	12,488	12,488	12,488	12,488	12,488
R-Squared	0.718	0.719	0.726	0.754	0.756

Notes: Columns (1) through (5) report the results of Equation 1.1. Column (2) includes the percent of people aged less than five and more than sixty. Column (3) includes interactions of cotton-textile production dummies and year fixed-effects. Column (4) includes region-by-year fixed effects. Column (5) includes a 20-bin age-share spline.

** Significant at the 1 percent level.
* Significant at the 5 percent level.

Table 1.9: Adjusted Effect of LBs of Health on Mortality

	Adoption Year (j=0)	First Year (j=1)	Second Year (j=2)	Third Year (j=3)	Fourth Year (j=4)
Cumulative Effect	-0.025	-0.073*	-0.107**	-0.120**	-0.142**
	(0.031)	(0.037)	(0.045)	(0.052)	(0.059)
Incremental Effect	-0.025	-0.048**	-0.034*	-0.013	-0.022
	(0.031)	(0.021)	(0.018)	(0.018)	(0.017)

Notes: The first row reports the results of the calculation defined by Equation 1.2 for each post-adoption event-year (i.e., each event-year between j=0 and j=4). "Cumulative effect" refers to the total mortality effect of the adoption of a union-wide local board of health *by* the jth event-year. The second row reports one-year differences of the estimates in the first row. "Incremental effect" refers to the total mortality effect of the adoption of a union-wide local board of health *in* the jth event-year. All standard errors are calculated using the delta method.

** Significant at the 1 percent level.

* Significant at the 5 percent level.

Table 1.10: Effect of LBs of Health on Mortality (Non-Adopters Omitted)

	(1)	(2)	(3)	(4)	(5)
BFRAC × EY=-4	-0.052	-0.054	-0.053	-0.042	-0.048*
	(0.031)	(0.030)	(0.028)	(0.024)	(0.022)
BFRAC × EY=-3	-0.045	-0.045	-0.046	-0.030	-0.032
	(0.028)	(0.028)	(0.024)	(0.022)	(0.022)
BFRAC × EY=-2	-0.020	-0.020	-0.024	-0.026	-0.026
	(0.032)	(0.032)	(0.031)	(0.029)	(0.029)
BFRAC × EY=0	-0.025	-0.025	-0.027	-0.014	-0.014
	(0.023)	(0.023)	(0.023)	(0.024)	(0.024)
BFRAC × EY=1	-0.055*	-0.055*	-0.050*	-0.041	-0.041
	(0.026)	(0.026)	(0.023)	(0.024)	(0.024)
BFRAC × EY=2	-0.072*	-0.072*	-0.070**	-0.059*	-0.059*
	(0.028)	(0.028)	(0.025)	(0.024)	(0.024)
BFRAC × EY=3	-0.069**	-0.069**	-0.074**	-0.065*	-0.066**
	(0.026)	(0.027)	(0.025)	(0.025)	(0.025)
BFRAC × EY=4	-0.082**	-0.081**	-0.082**	-0.078**	-0.080**
	(0.023)	(0.023)	(0.021)	(0.021)	(0.021)
BFRAC	0.155**	0.160**	0.141**	0.125**	0.145**
	(0.046)	(0.045)	(0.041)	(0.045)	(0.045)
Log RV per Capita	0.078**	0.070*	0.072*	0.076*	0.070*
	(0.030)	(0.029)	(0.029)	(0.031)	(0.027)
Log Population Density	-0.030	-0.048	-0.045	-0.049	-0.059
	(0.041)	(0.049)	(0.050)	(0.054)	(0.055)

Table 1.10: *Cont'd*

	(1)	(2)	(3)	(4)	(5)
Log Percent in Agriculture	-0.012	0.002	0.006	0.002	0.007
	(0.033)	(0.034)	(0.033)	(0.037)	(0.028)
Log Percent Under 5 Years		-0.085	-0.084	-0.080	
		(0.055)	(0.057)	(0.051)	
Log Percent Over 60 Years		-0.104	-0.113	-0.115	
		(0.077)	(0.079)	(0.082)	
Cotton × Year FEs			✓	✓	✓
Census Division × Year FEs				✓	✓
Twenty-Bin "Age Share" Spline					✓
Observations	6,021	6,021	6,021	6,021	6,021
R-Squared	0.660	0.661	0.674	0.706	0.710

Notes: Columns (1) through (5) report the results of Equation 1.1, omitting all 270 non-London unions within which no local board of health was adopted between 1848 and 1866. Column (2) includes the percent of people aged less than five and more than sixty. Column (3) includes interactions of cotton-textile production dummies and year fixed-effects. Column (4) includes region-by-year fixed effects. Column (5) includes a 20-bin age-share spline.

** Significant at the 1 percent level.
* Significant at the 5 percent level.

Table 1.11: Effect of LBs of Health on Mortality (Binary Treatment)

	(1)	(2)	(3)	(4)	(5)
BOARD × EY=-4	-0.038**	-0.036**	-0.033**	-0.028**	-0.029**
	(0.012)	(0.012)	(0.011)	(0.010)	(0.010)
BOARD × EY=-3	-0.018	-0.018	-0.016	-0.011	-0.011
	(0.012)	(0.012)	(0.011)	(0.011)	(0.011)
BOARD × EY=-2	-0.003	-0.003	-0.003	-0.002	-0.002
	(0.013)	(0.013)	(0.013)	(0.011)	(0.011)
BOARD × EY=0	-0.013	-0.013	-0.011	-0.005	-0.005
	(0.011)	(0.011)	(0.011)	(0.010)	(0.010)
BOARD × EY=1	-0.023	-0.023	-0.019	-0.014	-0.014
	(0.012)	(0.012)	(0.011)	(0.011)	(0.011)
BOARD × EY=2	-0.024	-0.024	-0.023	-0.020	-0.020
	(0.013)	(0.013)	(0.012)	(0.012)	(0.012)
BOARD × EY=3	-0.022	-0.021	-0.022	-0.018	-0.018
	(0.014)	(0.014)	(0.014)	(0.013)	(0.013)
BOARD × EY=4	-0.010	-0.008	-0.010	-0.008	-0.007
	(0.013)	(0.013)	(0.013)	(0.012)	(0.012)
Log RV per Capita	0.088**	0.082**	0.084**	0.094**	0.095**
	(0.034)	(0.031)	(0.030)	(0.035)	(0.034)
Log Population Density	-0.114	-0.152	-0.152	-0.153	-0.167
	(0.069)	(0.084)	(0.084)	(0.084)	(0.087)

Table 1.11: *Cont'd*

	(1)	(2)	(3)	(4)	(5)
Log Percent in Agriculture	-0.051	-0.035	-0.025	-0.023	-0.021
	(0.031)	(0.028)	(0.027)	(0.027)	(0.026)
Log Percent Under 5 Years		-0.052	-0.054	-0.046	-0.008
		(0.042)	(0.042)	(0.039)	(0.035)
Log Percent Over 60 Years		-0.165*	-0.184*	-0.180*	-0.058
		(0.083)	(0.083)	(0.082)	(0.217)
Cotton× Year FEs			✓	✓	✓
Census Division× Year FEs				✓	✓
Twenty-Bin "Age Share" Spline					✓
Observations	12,488	12,488	12,488	12,488	12,488
R-Squared	0.717	0.718	0.726	0.754	0.755

Notes: Columns (1) through (5) report the results of Equation 1.6. Column (2) includes the percent of people aged less than five and more than sixty. Column (3) includes interactions of cotton-textile production dummies and year fixed-effects. Column (4) includes region-by-year fixed effects. Column (5) includes a 20-bin age-share spline.

** Significant at the 1 percent level.
* Significant at the 5 percent level.

Table 1.12: Effect of LBs of Health on Mortality (Binary Treatment, by Board-Share)

	Only $BFRAC_{u,j=0}$ <0.27			Only $BFRAC_{u,j=0}$ >0.27		
	(1)	(2)	(3)	(4)	(5)	(6)
BOARD × EY=-4	-0.039*	-0.034*	-0.029	-0.040*	-0.040*	-0.042*
	(0.016)	(0.016)	(0.015)	(0.018)	(0.018)	(0.017)
BOARD × EY=-3	-0.014	-0.014	-0.004	-0.026	-0.026	-0.031*
	(0.017)	(0.017)	(0.015)	(0.017)	(0.017)	(0.015)
BOARD × EY=-2	0.002	0.002	0.005	-0.009	-0.009	-0.011
	(0.016)	(0.016)	(0.015)	(0.020)	(0.020)	(0.020)
BOARD × EY=0	-0.011	-0.011	-0.007	-0.015	-0.015	-0.016
	(0.018)	(0.018)	(0.017)	(0.013)	(0.013)	(0.013)
BOARD × EY=1	-0.013	-0.017	-0.006	-0.022	-0.022	-0.025
	(0.019)	(0.019)	(0.017)	(0.016)	(0.016)	(0.015)
BOARD × EY=2	-0.007	-0.006	-0.001	-0.014	-0.014	-0.022
	(0.018)	(0.018)	(0.016)	(0.020)	(0.019)	(0.018)
BOARD × EY=3	-0.007	-0.006	-0.001	-0.030	-0.030	-0.037*
	(0.023)	(0.023)	(0.022)	(0.017)	(0.017)	(0.016)
BOARD × EY=4	0.002	0.001	0.008	-0.010	-0.008	-0.014
	(0.020)	(0.020)	(0.019)	(0.017)	(0.017)	(0.016)
Log RV per Capita	0.080*	0.073*	0.076*	0.095*	0.091*	0.091*
	(0.040)	(0.034)	(0.035)	(0.042)	(0.037)	(0.036)
Log Population Density	-0.144	-0.194	-0.192	-0.197	-0.259*	-0.259*
	(0.087)	(0.100)	(0.102)	(0.102)	(0.120)	(0.119)

Table 1.12: *Cont'd*

	Only $BFRAC_{u,j=0}$ <0.27			Only $BFRAC_{u,j=0}$ >0.27		
	(1)	(2)	(3)	(4)	(5)	(6)
Log Percent in Agriculture	-0.078	-0.058	-0.047	-0.035	-0.011	-0.003
	(0.042)	(0.037)	(0.035)	(0.032)	(0.030)	(0.029)
Log Percent Under 5 Years		-0.028	-0.033		-0.033	-0.035
		(0.035)	(0.035)		(0.046)	(0.046)
Log Percent Over 60 Years		-0.212*	-0.235*		-0.230*	-0.245*
		(0.101)	(0.103)		(0.107)	(0.106)
Cotton × Year FEs			✓			✓
Observations	9,489	9,489	9,489	9,489	9,489	9,489
R-Squared	0.739	0.740	0.746	0.731	0.733	0.740

Notes: Columns (1) through (6) report the results of Equation 1.6. Columns (1) through (3) omit all 126 unions within which the first board adopted accounted for less than 27.27 percent of its population (i.e., above-median board-share unions). Column (4) through (6) omit all 126 unions within which the first board adopted accounted for more than 27.27 percent of its population (i.e., below-median board-share unions). Columns (2) and (5) include the percent of people aged less than five and more than sixty. Columns (3) and (6) include interactions of cotton-textile production dummies and year fixed-effects.

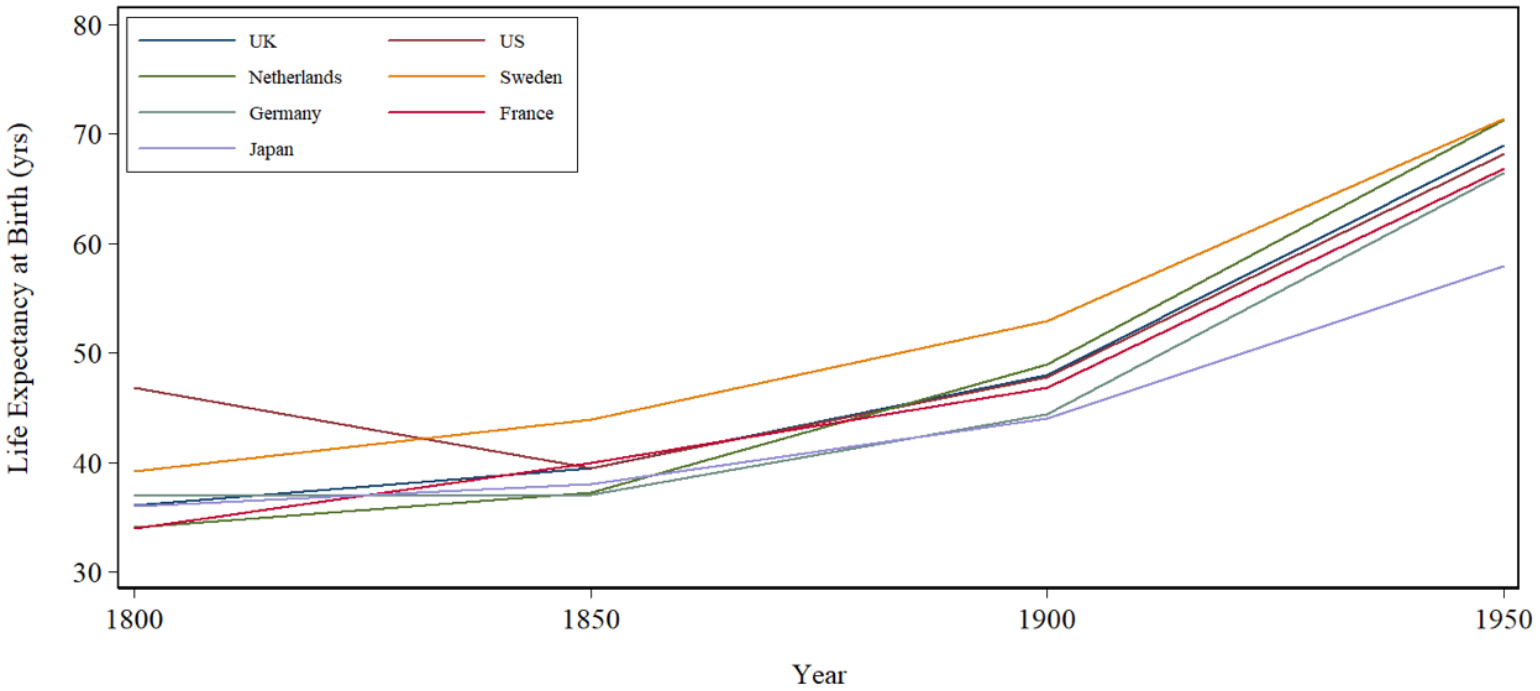
** Significant at the 1 percent level.
* Significant at the 5 percent level.

Table 1.13: Effect of LBs of Health on Mortality (DiD vs. Event-Study)

	(1)	(2)	(3)	(4)
Panel A. Difference-in-Differences Estimates				
BFRAC × POST	-0.015	0.029	-0.018	-0.012
	(0.021)	(0.028)	(0.015)	(0.017)
Observations	12,488	12,488	12,488	12,488
R-Squared	0.051	0.089	0.711	0.753
Panel B. Event-Study Estimates				
BFRAC × EY=-4	-0.075**	-0.092*	-0.061*	-0.052*
	(0.029)	(0.030)	(0.030)	(0.026)
BFRAC × EY=-3	-0.043	-0.052*	-0.051	-0.040
	(0.028)	(0.026)	(0.027)	(0.022)
BFRAC × EY=-2	0.000	-0.023	-0.022	-0.023
	(0.038)	(0.032)	(0.033)	(0.029)
BFRAC × EY=0	-0.035	-0.023	-0.023	-0.008
	(0.023)	(0.023)	(0.023)	(0.025)
BFRAC × EY=1	-0.062*	-0.050	-0.051*	-0.038
	(0.025)	(0.028)	(0.026)	(0.024)
BFRAC × EY=2	-0.062*	-0.056*	-0.062*	-0.055*
	(0.027)	(0.028)	(0.028)	(0.025)
BFRAC × EY=3	-0.061*	-0.050	-0.059*	-0.051*
	(0.026)	(0.027)	(0.026)	(0.025)
BFRAC × EY=4	-0.071**	-0.037	-0.069**	-0.056*
	(0.028)	(0.032)	(0.023)	(0.023)
Observations	12,488	12,488	12,488	12,488
R-Squared	0.052	0.090	0.712	0.754
Year FEs		✓	✓	✓
Union FEs			✓	✓
Controls				✓

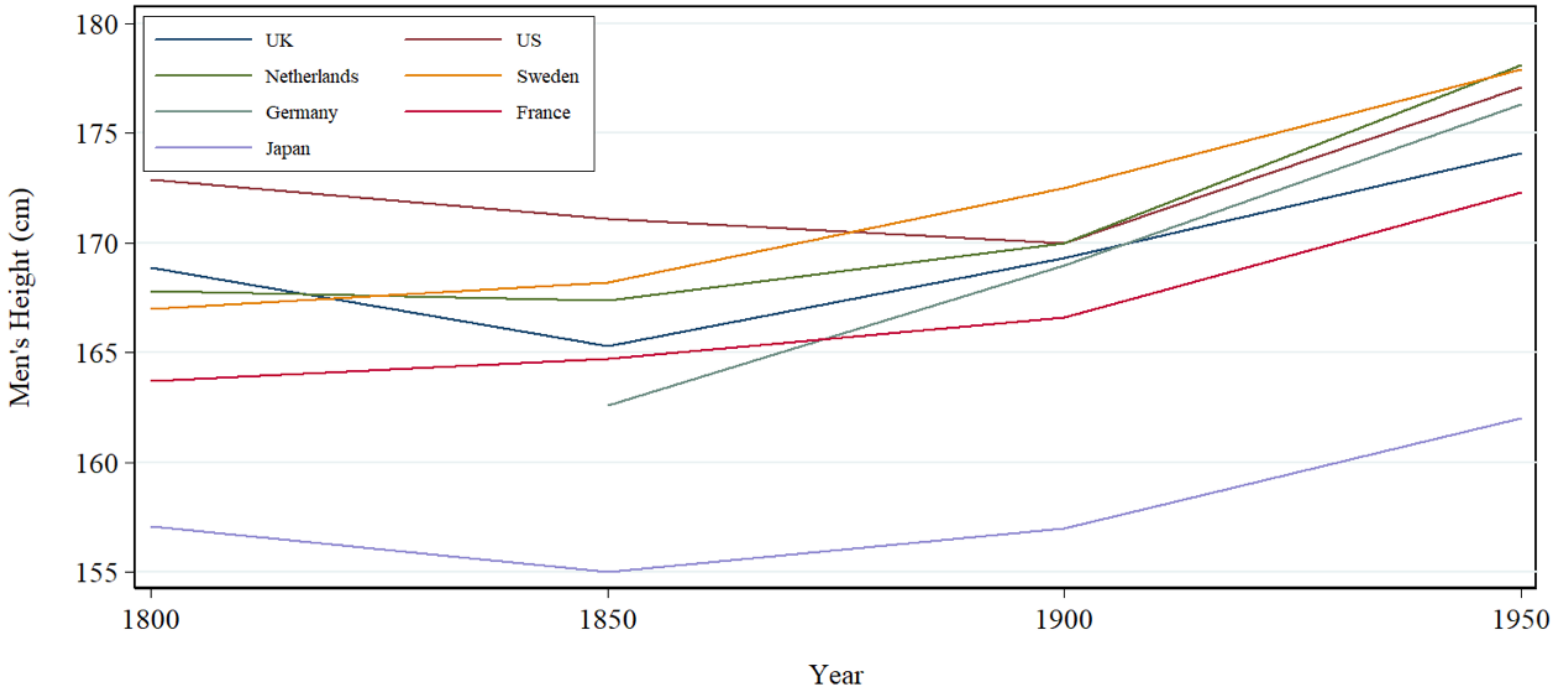
Notes: Panel A reports estimates of the effect of the adoption of a local board of health on the rate of morality using a difference-in-differences model (i.e., a model of the form $DR_{ut} = \beta_0 + \pi(BFRAC_{ut} \times POST_{ut}) + \beta_1 BFRAC_{ut} + \epsilon_{ut}$, where $POST_t$ is a dummy variable that takes a value of 1 if union u had adopted a board by year t and 0 otherwise). Panel B reports estimates of the effect of the adoption of a local board of health on the rate of mortality using an event-study model (i.e., a model of the form of Equation 1.1).

Figure 1.1: Life Expectancy at Birth (1800-1950)



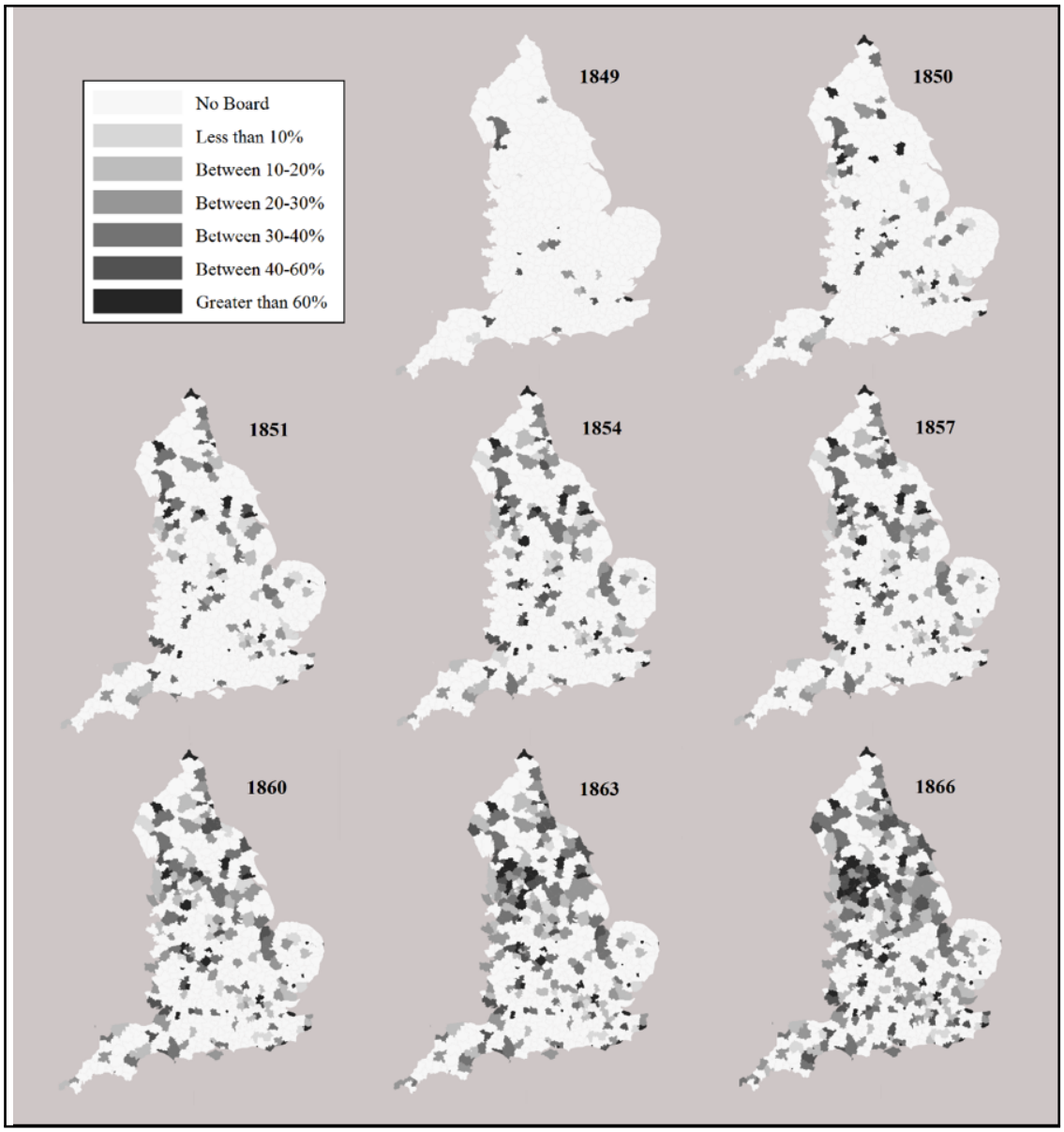
Source: [102].

Figure 1.2: Men's Height (1800-1950)



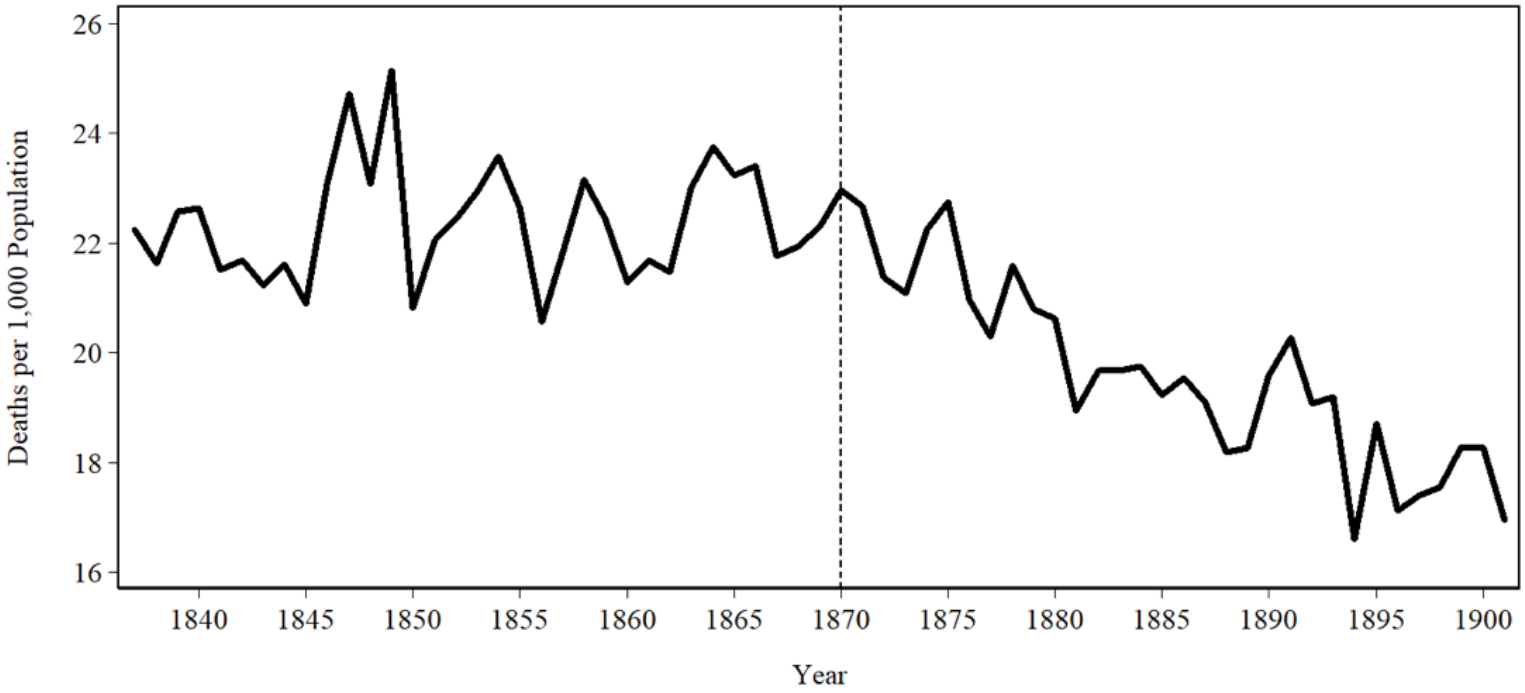
Source: [102].

Figure 1.3: Fraction of Union Population Under a Local Board



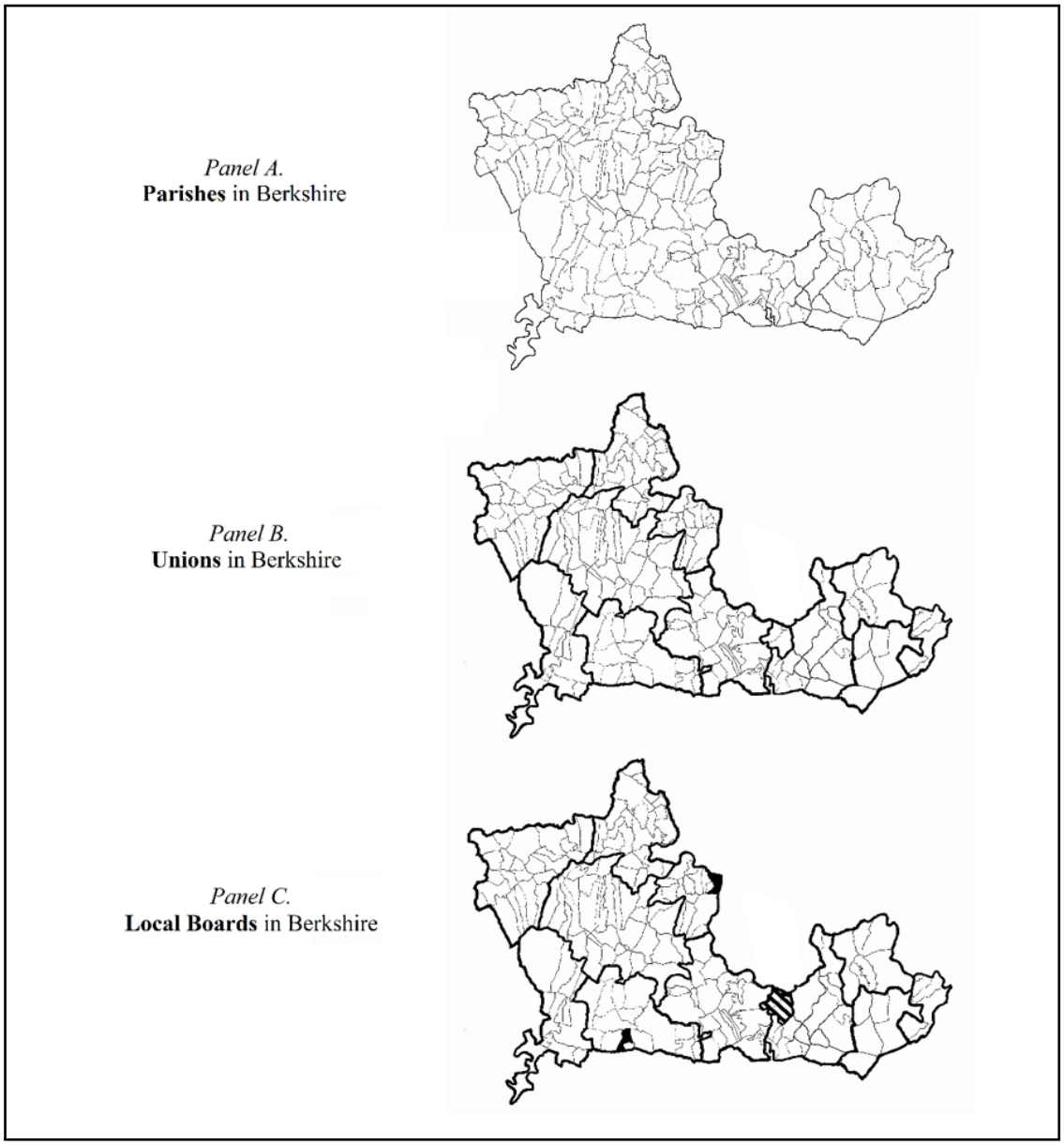
Source: Local board locations, populations, and adoption dates derive from the *Return of Local Boards* (1868). Union populations derive from *Decennial Census Reports* (1841-71). Union "polygons" used in the construction of these maps have been provided through `www.VisionofBritain.com` and use historical material which is copyright of the Great Britain Historical GIS Project and the University of Portsmouth.

Figure 1.4: Aggregate Mortality in England & Wales



Source: *Annual Reports of the Registrar General* (1837-1901)

Figure 1.5: English Local Government Areas



Source: Panel A illustrates the boundaries of the parishes in the county of Berkshire in 1851. Panel B illustrates the boundaries of the Poor Law unions in the county of Berkshire in 1851, as well as each parish contained therein. Panel C illustrates the location of each of the three local boards of health adopted in Berkshire between 1848 and 1870. Solid black shading indicates that a parish is wholly within the jurisdiction of a local board. Striped black shading indicates that a parish is only partly within the jurisdiction of a local board.

Figure 1.6: Distribution of Board Adoptions per Union (1848-66)

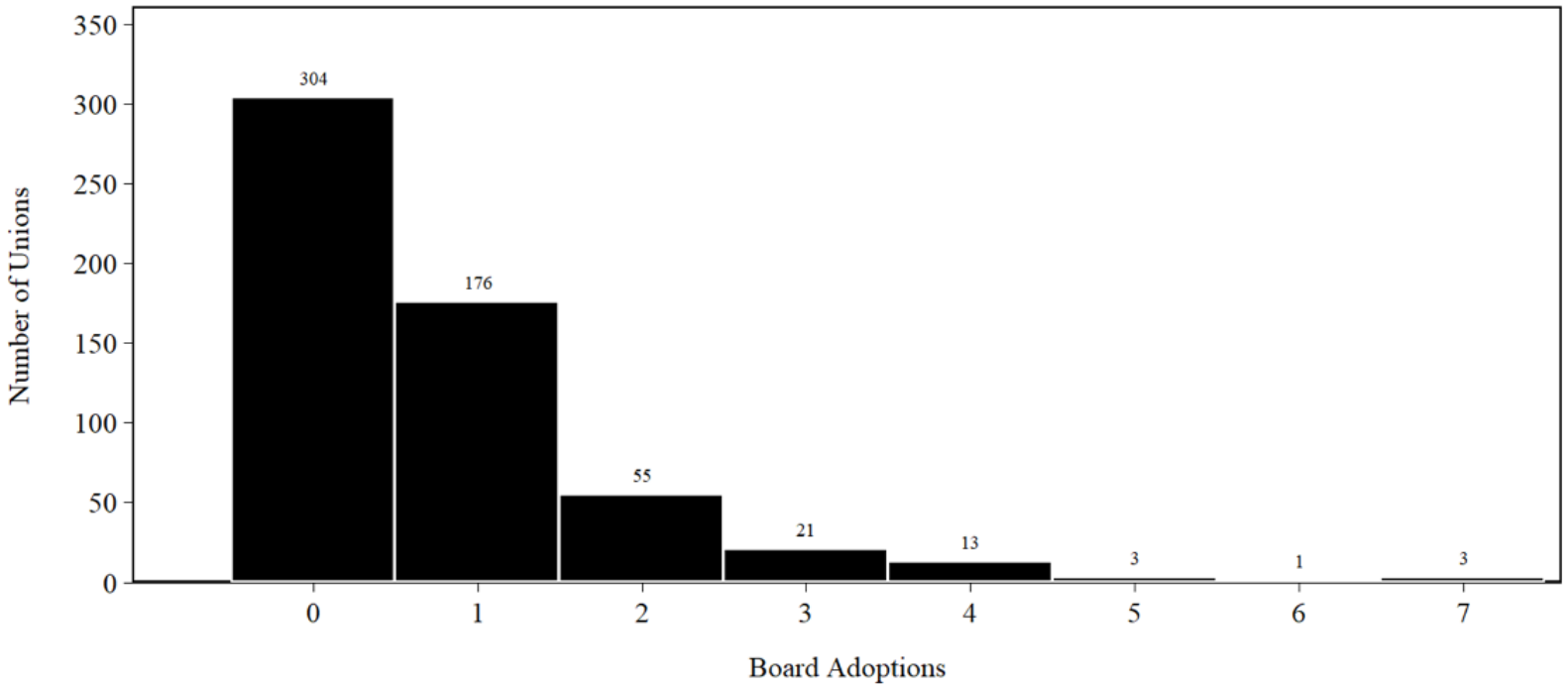
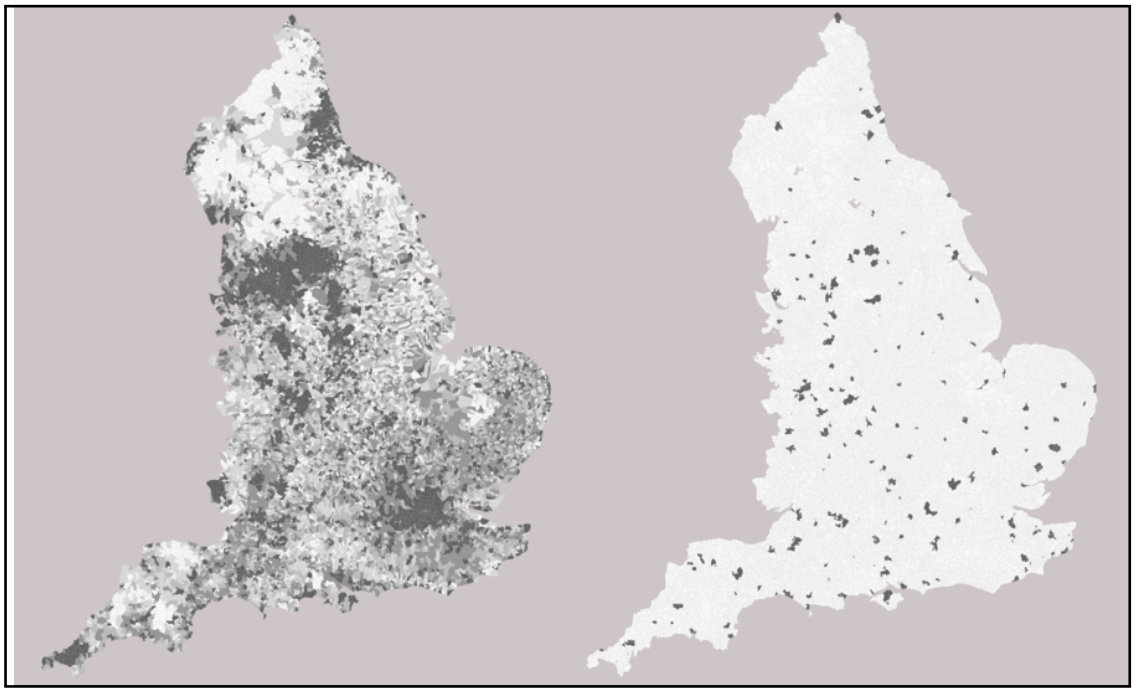


Figure 1.7: Rollout of Local Boards of Health

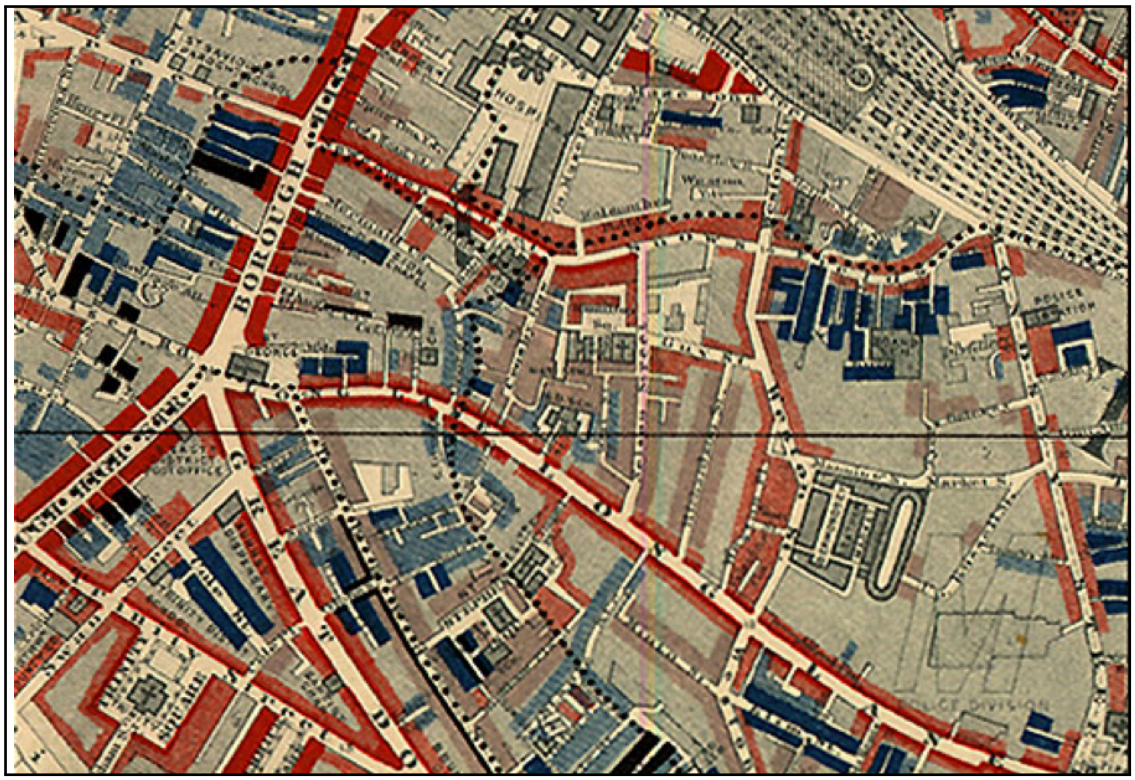
Source: The population, rateable value, and adoption date of local boards derive from the *Return of Local Boards* (1868).

Figure 1.8: Location of Municipal Boroughs



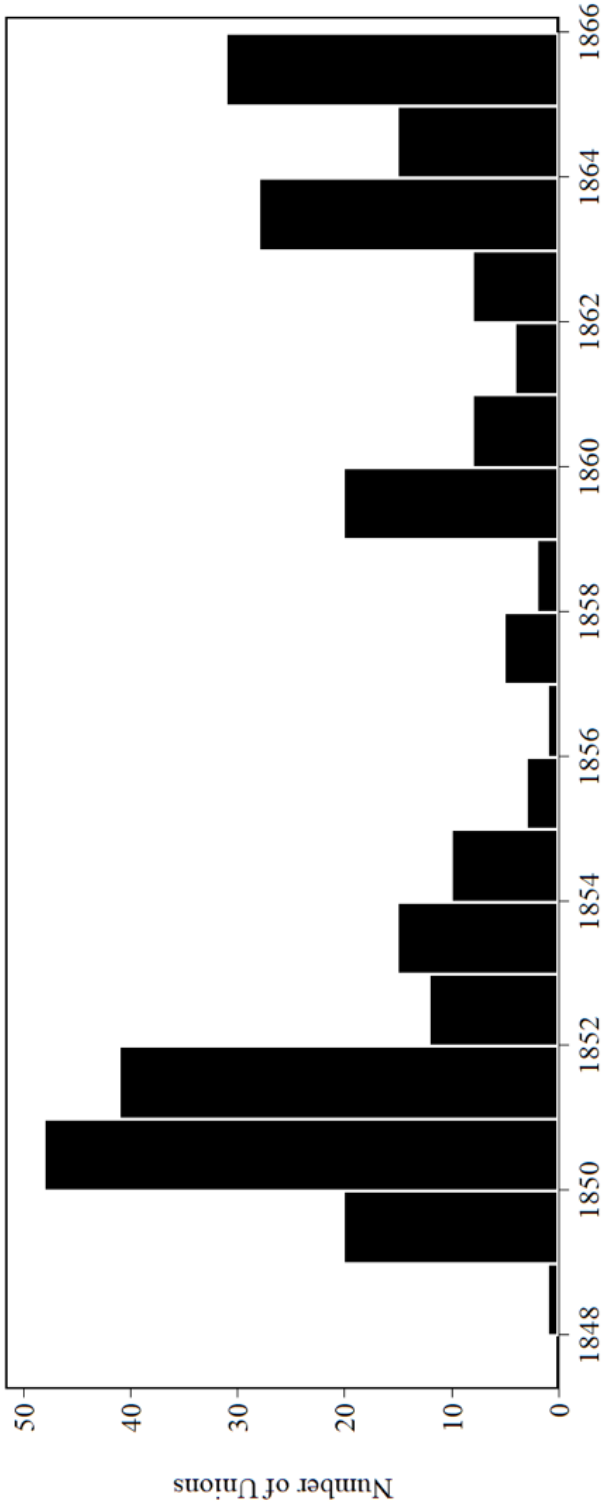
Notes: The rightmost map plots the location of municipal boroughs according to the 1851 Census Report. Civil parishes colored black are either entirely or partially under the jurisdiction of a municipal borough (i.e., any place regulated by the Municipal Corporations Act of 1835, not to be confused with a "parliamentary borough," which returned members to Parliament, though there is significant overlap between the two borough "types"). Civil parishes colored white contain no part of any municipal borough. The leftmost map plots quintiles of population density by civil parish in 1871. Quintile cutoffs, from light to dark, are as follows. The first quintile consists of parishes with fewer than 0.11 persons per acre; the second, between 0.11 and 0.17 persons per acre; the third, between 0.17 and 0.23 persons per acre; the fourth, between 0.23 and 0.42 persons per acre; and the fifth, greater than 0.42 persons per acre. Parish populations, areas, and "polygons" used in the construction of these maps have been provided through www.VisionofBritain.com and use historical material which is copyright of the Great Britain Historical GIS Project and the University of Portsmouth.

Figure 1.9: Booth's Poverty Maps



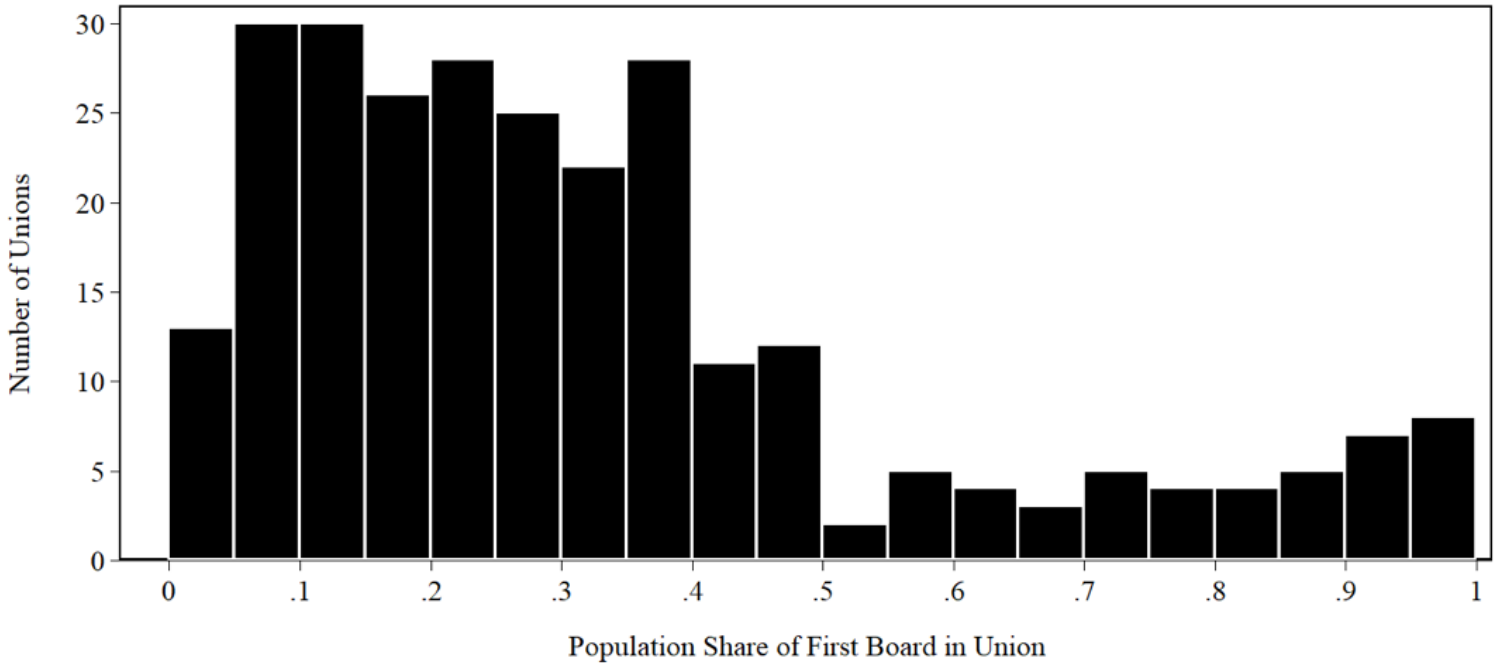
Notes: Pictured above is a sample of Charles Booth's poverty maps from *Life and Labour of the People of London, Vol. I* (1889). Residences are colored according to the general economic condition of their inhabitants. Red shading denotes middle-class or well-to-do residences. Beige shading denotes mixed residences (i.e., "some comfortable, others poor"). Blue shading denotes poor to very poor residences (i.e., "chronic want"). Black shading denotes the lowest class residences (i.e., "vicious, semi-critical"). See [21].

Figure 1.10: Adoption Years of Local Boards of Health



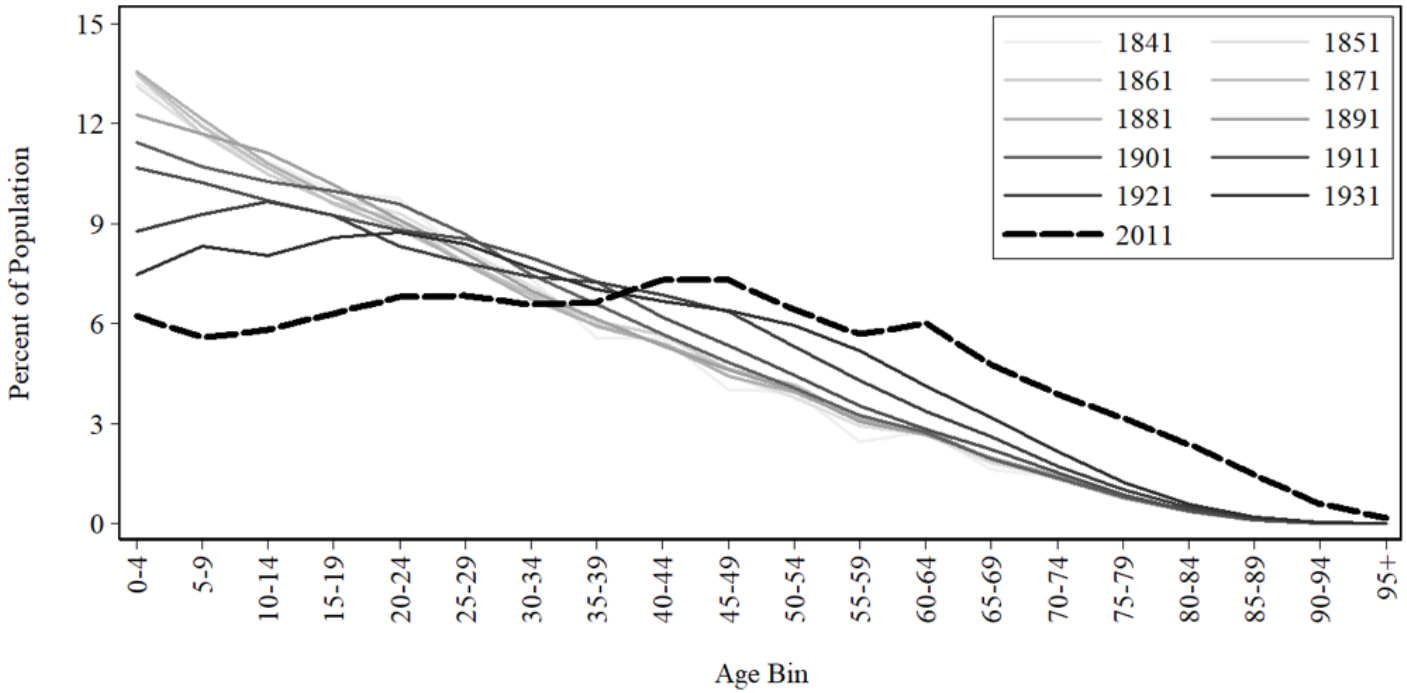
Source: Board adoption years derive from the *Return of Local Boards* (1868).

Figure 1.11: Population Share of Local Boards of Health



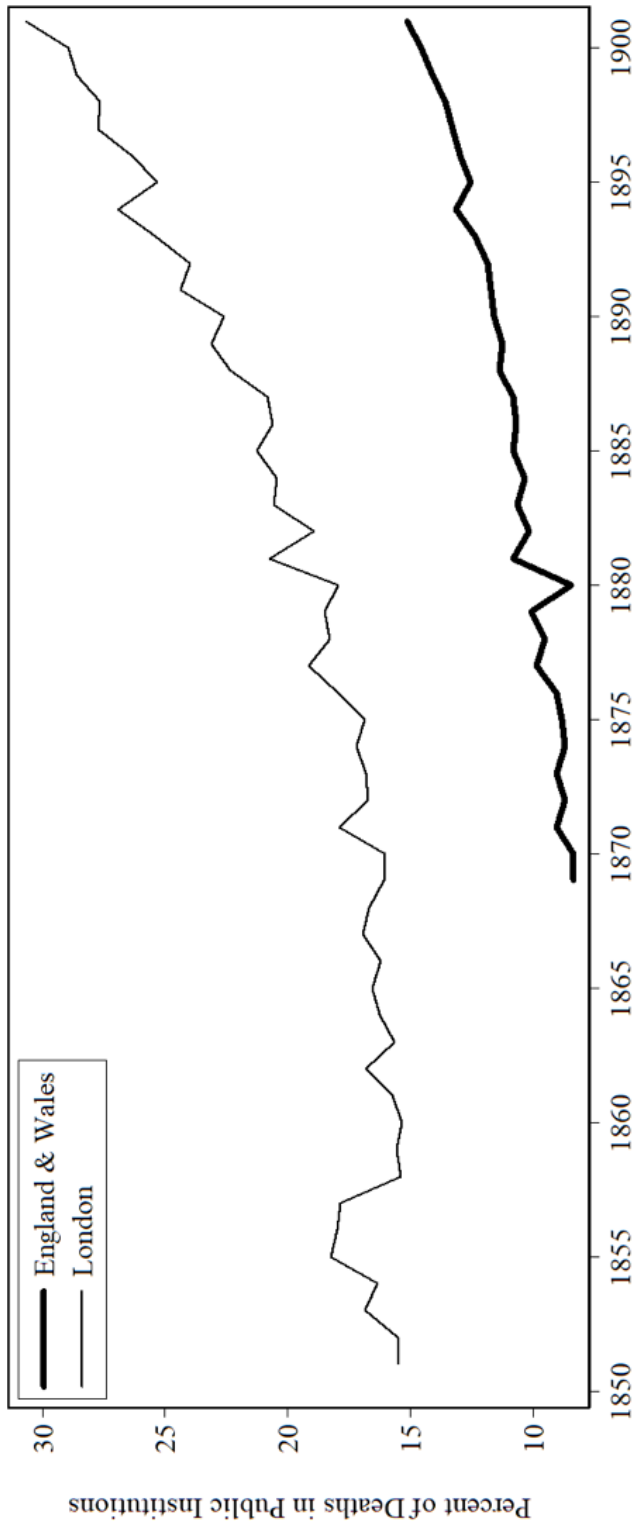
Source: Board populations derive from the *Return of Local Boards* (1868).
Union populations derive from *Decennial Census Reports* (1861-71).

Figure 1.12: Age Distributions of England (1841-2011)



Source: *Decennial Census Reports* (1841-1931, 2011)

Figure 1.13: Percent of Deaths in Public Institutions



Source: Annual Reports of the Registrar-General (1851-1901)

Figure 1.14: Event Study

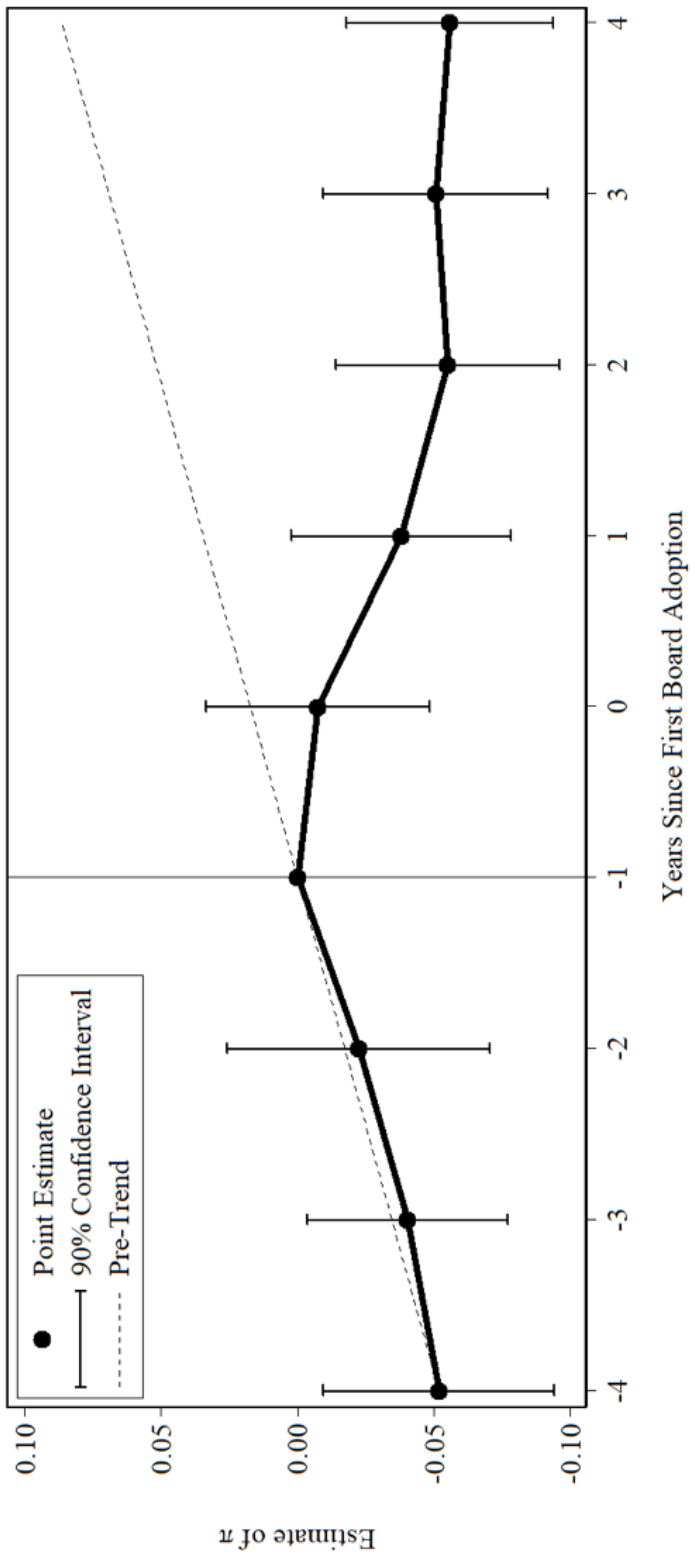


Figure 1.15: Implied England-Wide Effect of Local Boards

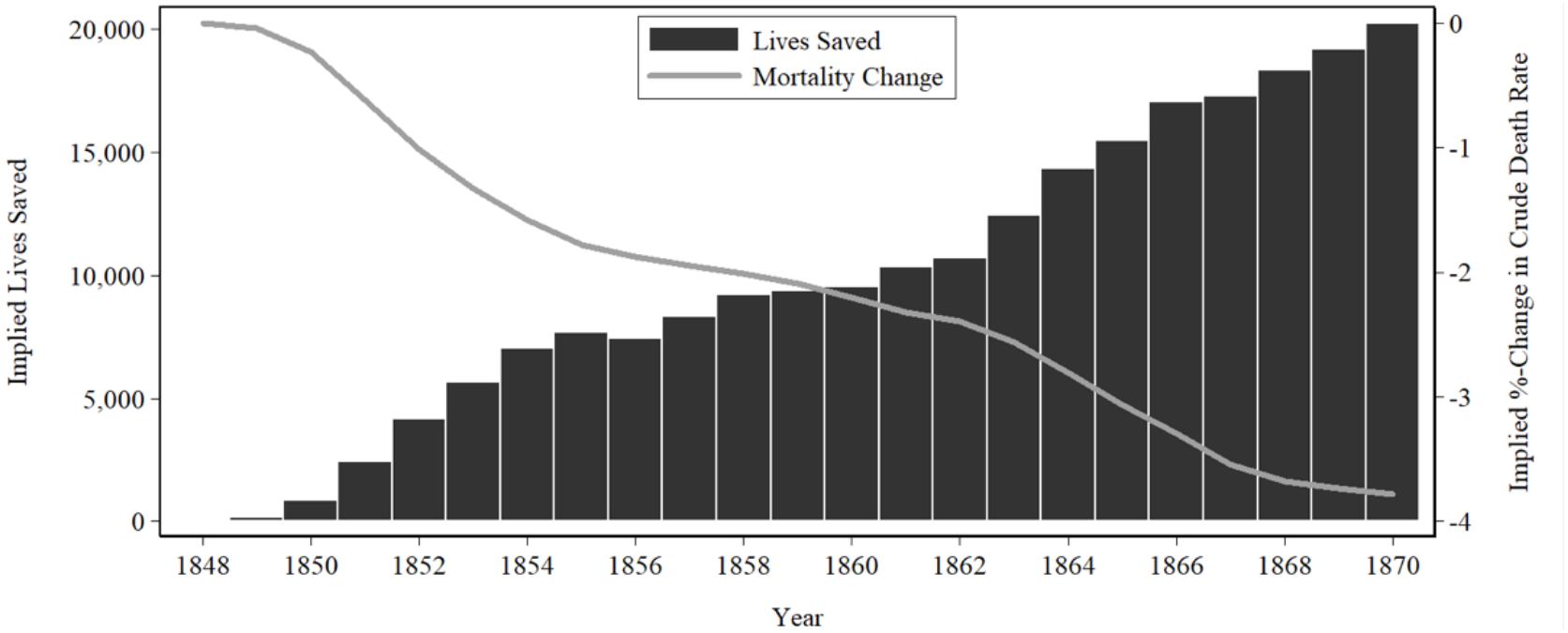


Figure 1.16: Actual & Counterfactual English Mortality Rate

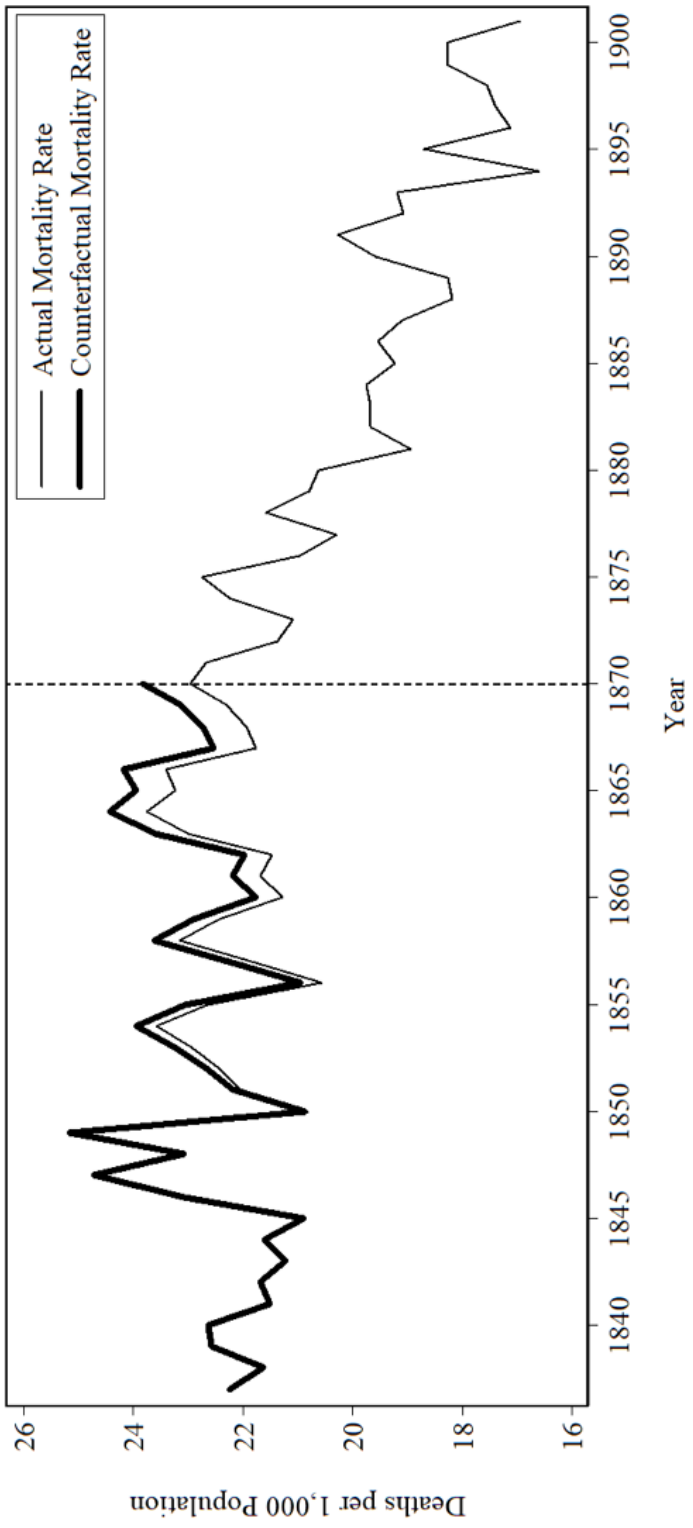
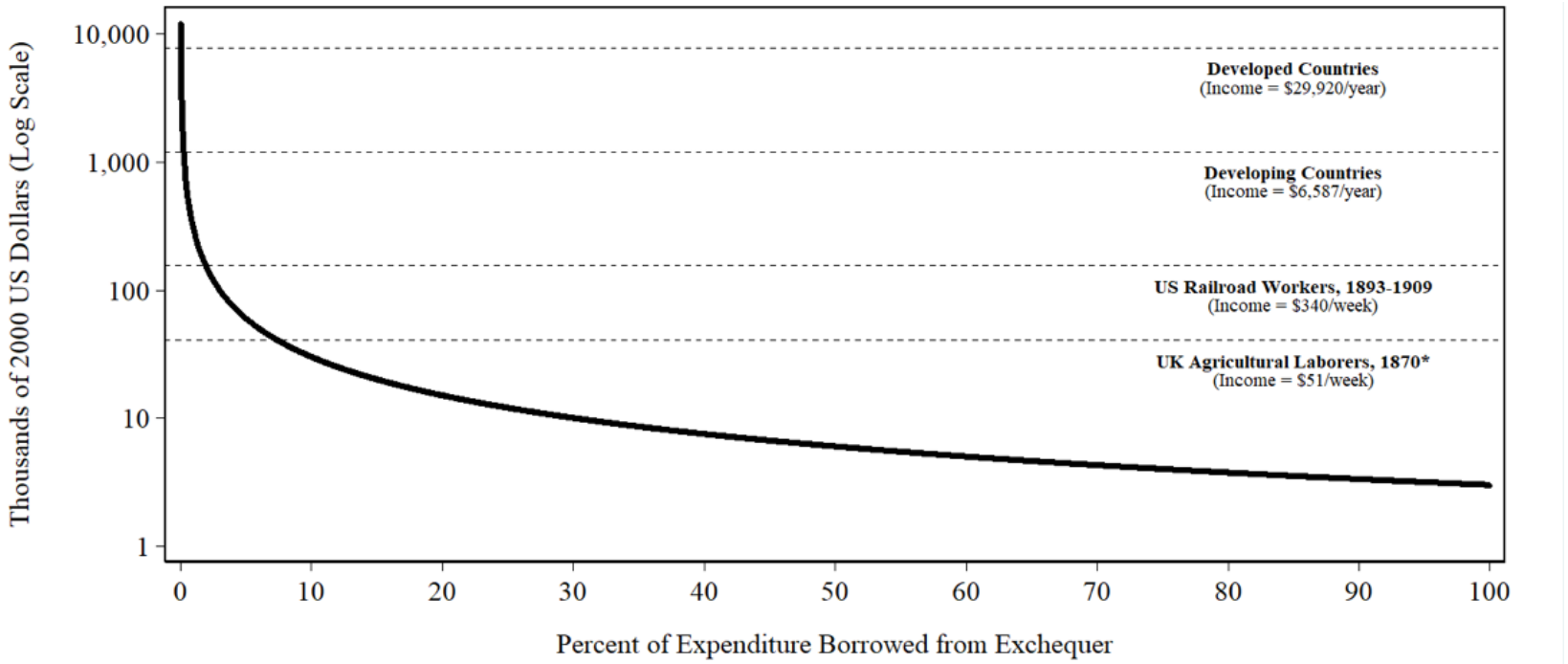


Figure 1.17: Cost Per Life Saved (With VSL Estimates)



Notes: The solid line plots the cost-per-life-saved curve. The dashed lines plot VSL estimates. The VSL estimates of developed and developing countries are medians of groups of VSL estimates obtained from Viscusi & Aldy (2003). The VSL estimate of US railroad workers is obtained from Kim & Fishback (1993). The VSL estimate of UK agricultural laborers is derived from the VSL estimate of US railroad workers using the difference in average weekly income between the two samples and an income elasticity of VSL of 0.5. The average weekly income of UK agricultural laborers is obtained from Bowley (1898). See [109], [61], and [23].

CHAPTER 2

HARDLY WORTH CHAINING UP? THE EFFECT AND COST-EFFECTIVENESS OF WELFARE REFORM IN ENGLAND, 1857-85

2.1 Introduction

"If paupers are made miserable, paupers willdecline in multitude. It is a secret known to all rat-catchers" [29, p. 175].[1] This was not an exceptional, or even uncommon, opinion in England in the middle of the nineteenth century. There was, and had long been, consternation among reformers regarding the relatively high rate at which English men and women applied for and received welfare benefits, and the relatively high tax burden associated with those benefits. The English welfare system—hardly a system, by modern standards—was called the Poor Law. It was administered by local geographical units called Poor Law unions, of which there were approximately 600. Each Poor Law union was required by the Law to provide benefits to any needy, or any apparently needy, applicant within its jurisdiction, but was free to decide the form that those benefits took. Benefits took two forms. *Outdoor relief* was cash or in-kind allowances of food, fuel, or clothing. *Indoor relief* was room and board in a workhouse. Inmates of workhouses were separated by age, sex, and fitness for work, and often, but not always, compelled to complete menial tasks such as spinning, weaving, or oakum picking.[2] Workhouses were made "as like prisons as possible, to establish therein a discipline so severe and repulsive as to make them a

[1] Note that "pauper" is synonymous with "welfare recipient." Note also that Carlyle was caricaturing the opinion of adversaries of the "old," pre-1834 English Poor Law. This system was replaced by the "new," post-1834 English Poor Law by the Poor Law Amendment Act.

[2] Although "attempts to employ the poor profitably [in workhouses] were widespread in the eighteenth century, they were invariably failures." See [24, p. 22].

terror to the poor and prevent them from entering" [107, p. 267]. Workhouses were a tool, however inhumane, by which Poor Law administrators believed that they could disincentivize poverty-inducing behavior, distinguish the "truly needy" from the apocryphally needy, and, in so doing, reduce the rate of overall relief recipiency. If a relief applicant to whom the workhouse was offered refused the offer, then the Poor Law union to which that applicant applied would have fulfilled its obligation without relieving, and without paying for the relief of, that applicant.

In this essay, I leverage variation in the change in the fraction of paupers relieved indoors between 1865 and 1880 across 576 English Poor Law unions to estimate whether and to what extent conditions attached to relief recipiency (i.e., the workhouse) affected the rate of relief recipiency. At least as early as 1869, a pro-workhouse movement called the Crusade Against Outrelief advocated for the elimination of outdoor relief to all able-bodied relief applicants. Among the Crusade's most ardent advocates were administrators of Poor Law unions. As such, the average Poor Law union relieved 63 percent more of its paupers in the workhouse in 1880 than it did in 1865. Nearly one-quarter of all Poor Law unions doubled (or more than doubled) the fraction of paupers that they relieved in the workhouse. This Crusade was, in effect, a de facto, decentralized welfare reform. Since Poor Law unions were administratively autonomous and, on average, relatively small in size (85 square miles in 1861) and population (32,000 persons in 1861), the Crusade-era Poor Law provides an historically unique source of policy variation.

I make three main contributions. First, I introduce a new panel dataset of 576 English Poor Law unions between 1857 and 1887, assembled, among other

sources, from decennial census reports, reports of Parliament, reports of the Poor Law Board, reports of the Local Government Board, and Knight's *Local Government Directory*.[3] These data include population; population density; coal and cotton-textile production; the percent of adults working in agriculture, industry, and manufacturing; the number of paupers relieved indoors and outdoors by age, sex, and fitness for work; the capacity of and conditions within workhouses; the number of calories and grams of fat, protein, and carbohydrates provided to workhouse inmates; and the tax rate levied on "ratepayers." Second, I use a difference-in-differences model to demonstrate that the workhouse was *very* effective. I find that a 50 percent increase in the fraction of paupers relieved indoors would have reduced the pauperism rate by 13.2 percent. Put differently, approximately three in four welfare applicants to whom the workhouse was offered as a "test" refused the offer. The workhouse was, nevertheless, insufficiently effective to meaningfully reduce costs. Since workhouses were expensive to build, to staff, and to maintain, indoor relief was at least 50 percent more expensive per pauper than outdoor relief [74, p. 608]. Third, I use a triple-difference model to demonstrate that the relationship between workhouse use and pauperism was roughly independent of the disagreeableness of the workhouse. I find little evidence that workhouses deficient in ventilation, water supply, general sanitation, or diet were uniquely effective. This is consistent with a stigma-type story of welfare—it was the stigma of entering a workhouse, not the considerable physical or psychological toll of living in a workhouse (which varied across Poor Law unions), that ultimately screened and/or deterred would-be paupers from relief rolls.

[3] "The firm of C. Knight & Co., Poor Law Publishers of 90 Fleet Street, supplied [Poor Law unions] with books and forms under the Poor Law Commission—[Mr. Knight] having done much, with Mr. Chadwick and Sir G. Cornwall Lewis, in promoting the passing of the Poor Law Amendment Act, under the provisions of which the Poor Law—now the 'Local Government Board' at Gwydyr House—was formed and its orders consolidated." See [79, pp. 419-20].

The remainder of this essay is organized as follows. In Section 2.2, I provide a brief history of the English Poor Law—its origins, its administrative features, and its evolution during the Crusade—and an explanation of what I call the "workhouse effect." In Section 2.3, I introduce my dataset and empirical strategy, discuss identification and potential threats to identification, interpret my results, and investigate what could have caused the Crusade. In Section 2.4, I conclude.

2.2 Institutional Background

2.2.1 The English Poor Law

The Poor Relief Act of 1601 (also called the *Old* Poor Law) first established the principle of compulsory taxation for the relief of the poor as "an essential portion of...[English] domestic policy" [85, p. 187]. In every parish in England, of which there were roughly 15,000, overseers of the poor were appointed to assess the property value of all dwellings, to impose a tax (a "poor rate") on all owners and occupiers of these dwellings proportional to their value, and to distribute the revenues therefrom to the needy in the form of cash or in-kind payments. Although the Act required that "a stock of flax, hemp, wool, thread, iron, and other necessary ware" be kept in order to "set to work" able-bodied relief applicants, the overwhelming majority of all relief was outdoor relief. The ease with which relief was (or, at least, could be) obtained was the single greatest misgiving around which debate over reform of the Old Poor Law revolved.

The workhouse was the sticking point. A formal "workhouse test" appeared

in English law at least as early as the Workhouse Test Act of 1722, which "encouraged parishes to relieve able-bodied paupers in workhouses" and to deny relief to relief applicants that refused to enter the workhouse [24, p. 24]. The workhouse test, it was believed, could reduce the number of paupers for whom parishes were responsible. But most parishes were insufficiently populous to marshal the tax revenue necessary to construct, staff, and stock a functioning workhouse. The average parish consisted of only 500 persons in 1801. To solve this population problem Gilbert's Act of 1782 permitted (but did not compel) parishes to combine into "Gilbert's Unions" for the purpose of maintaining a shared workhouse. All told, 963 parishes combined to form 65 Gilbert's Unions, but "the grouping of parishes [into Gilbert's Unions] was not systematic." Many Gilbert's Unions consisted of non-contiguous parishes and, therefore, their workhouses were very often inconveniently located for ordinary use [67, pp. 40-41]. Moreover, Gilbert's Act codified (and, in so doing, legitimized) the already commonplace practice of outdoor relief to the able-bodied [24, p. 10]. Section 32 of the Act made it lawful to "properly maintain" any able-bodied relief applicant who was "able and willing to work, but who [could not] get employment." Relief expenditures exploded thereafter. Lindert (2004) estimates that relief expenditures, as a proportion of national product, increased by upwards of 150 percent between 1750 and 1830 [66, p. 46]. The belief that easy access to outdoor relief was responsible for this increase, and for the corresponding increase in local poor rates, precipitated attempts to amend the Old Poor Law.[4]

[4]Malthus (1798) objected to the Old Poor Law because it enabled the English population to grow too quickly. "It is better," he wrote, "that [population] should be checked from a foresight of the difficulties attending a family and a fear of dependent poverty than that it should be encouraged, only to be repressed afterwards by want and sickness." Though it "alleviated the intensity of individual misfortune, [it] spread the general evil over a much larger surface...[by] increasing the population without increasing the food for its support." Ricardo (1817), likewise, concluded that "the clear and direct tendency of the [Old Poor Law] is not, as the legislature

The Poor Law Amendment Act of 1834 (also called the *New* Poor Law) was a watershed. The objective of the Act, not unlike some of its predecessors, was twofold: first, to relieve *only* the genuinely needy, and second, to minimize the incidence of *neediness*. The Act can be summarized in six parts:

Poor Law Unions. All parishes were combined into Poor Law unions. This was the Act's key innovation. The average Poor Law union, in 1857, consisted of between 15 and 20 parishes and between 2,000 and 3,000 persons. A small number of Poor Law unions consisted of a single populous parish (e.g., Liverpool, Manchester). A small number of others consisted of more than 50 relatively unpopulous parishes.

Boards of Guardians. All Poor Law unions established a board of guardians. According to Section 54 of the Act, guardians were responsible for "ordering, giving, and directing all relief to the poor." Parish overseers were stripped of the authority "to grant relief, except in cases of sudden and urgent necessity, without an order of the board" [73, p. 158]. Guardians were allocated to (and elected by taxpayers within) each parish "with due regard to the circumstances of the parish" (e.g., population, industrial composition, etc.).[5]

Workhouses. All Poor Law unions built workhouses. According to Section 23 of the Act, Poor Law unions were required to "build a workhouse or workhouses,

benevolently intended, to amend the condition of the poor, but to deteriorate the condition of both poor and rich; instead of making the poor rich, they are calculated to make the rich poor." Other opponents of the Old Poor Law considered it "a bounty on indolence and vice" by "putting the thrifty in the same position as the unthrifty," thereby "discouraging thrift." The preamble of the Friendly Societies Act of 1819 suggested that "the habitual reliance of poor people upon parochial relief, rather than upon their own industry, tends to the moral deterioration of the people; it is desirable that encouragement should be afforded to persons desirous of making provision for themselves...out of the fruits of their own industry." See [76], [95], [72, p. 140], and [4, pp. 227-228].

[5]Only taxpayers owning or occupying property valued at £25 per year were eligible for election to the board of guardians. See [73, p. 158]. County magistrates were also eligible to serve as *ex officio* board members in the Poor Law unions in which they lived.

and to purchase or hire land for the purpose of building the same thereon, or to purchase or hire a workhouse or workhouses, or any building or buildings for the purpose of being used as or converted into a workhouse or workhouses."

Common Funds. All Poor Law unions established a common fund. According to Section 28 of the Act, parishes contributed to the common fund of the Poor Law union to which they belonged in proportion to the number of paupers that they relieved in the common union workhouse. If, for example, a particular parish sent disproportionately many paupers to the workhouse, and was therefore disproportionately responsible for the cost of the workhouse, then it would bear a disproportionate share of the tax burden. The common fund was earmarked for "the purchasing, building, hiring, or providing, altering, or enlarging any workhouse..., and for the future upholding and maintenance of such workhouse..., and for the payment or allowance of the officers of such union, and for the providing of utensils and materials for setting the poor on work therein."

Poor Law Commission. Three Poor Law commissioners were appointed by the monarch, with the "advice and consent" of Parliament. According to Sections 1 and 2 of the Act, Poor Law commissioners were empowered to "require the attendance of all such persons as they may think fit to call before them upon any question or matter connected with or relating to [the Poor Law]...and examine all such persons upon oath" in order to "carry the Act into execution." The Poor Law Commission was eventually replaced by the Poor Law Board in 1847, which, in turn, was eventually replaced by the Local Government Board in 1871.

Assistant Commissioners. Nine assistant Poor Law commissioners were ap-

pointed by the Poor Law Commission. According to Section 12 of the Act, assistant Poor Law commissioners, like Poor Law commissioners, were empowered to "summon before them such persons as they may think necessary for the purpose of being examined upon oath." Assistant Poor Law commissioners also determined which parishes would belong to which Poor Law unions, and the number of guardians to which each parish was entitled.

The Act did not abolish the parish. Parishes continued to levy and collect poor rates. Instead, the Act subordinated the parish to the Poor Law union and the Poor Law union to the Poor Law Commission. But the Poor Law Commission was institutionally weak—very weak. Its first order, for example, mandated that "no [outdoor relief] be given to any able-bodied male pauper who is in employment...and in receipt of earnings" [3, p. 162]. This order was ignored. Subsequent orders mandated similar restrictions on outdoor relief and were likewise ignored, avoided, or only inconsistently applied by Poor Law unions.[6] Poor Law unions were, in effect, independent administrative units. "The tendency everywhere," wrote one Poor Law inspector in 1856, "is to substitute outdoor relief for indoor relief whenever the guardians may legally do so" [43, p. 57]. One legal loophole was "to find some trifling ailment in the family so that medical relief could be given...on the ostensible grounds of sickness or accident" [33, p. 73]. By 1859, less than 10 percent of able-bodied paupers and less than 15 percent of all paupers were relieved in workhouses. It was not until the middle of the 1860s, when a group of reformers, some of whom were themselves guardians of Poor Law unions, established a "Crusade Against Out-relief," that the original intent of the Poor Law Amendment Act began to be realized. Foremost among the proponents of this Crusade was the Charity Or-

[6]These orders included the Outdoor Labour Test Order of 1842, the Outdoor Relief Prohibitory Order of 1844, and the Outdoor Relief Regulation Order of 1852.

ganization Society.

The Society was founded in London in 1869. The Goschen Minute—its founding document—warned of the dangers of easy access to outdoor relief, especially "to supplement insufficiency of wages." Too safe a safety net would "supplant the full recognition of the necessity for self-reliance and thrift" [5, pp. 9-12].[7] The Society believed that it was essential to "investigate the circumstances of the destitute carefully" and, whenever possible, to "substitute charity for poor relief" [74, p. 606]. Charity could discriminate between the "deserving poor" and the "undeserving poor." The Poor Law could not. For that reason, the Society preferred private charity to public poor relief, and indoor relief to outdoor relief.

The Society, their Crusade, and the policy prescriptions for which it advocated were wholeheartedly adopted by many Poor Law unions and all but disregarded by many others between 1865 and 1880 [22, p. 266]. Hurren (2000), for example, identifies the Brixworth union in Northamptonshire as a characteristic "Crusade union" [57]. Williams (1981) identifies 41 "Crusade unions" in all, more than half of which were in Metropolitan London [114, pp. 104-105]. But this simple taxonomy insinuates that the Crusade was an all-or-nothing proposition—that Poor Law unions either were or were not "Crusade unions." In fact, the Crusade was adopted by degrees. Figures 2.1 and 2.2 juxtapose a map of Williams' "Crusade unions" with a map of actual percent-changes in the fraction of paupers relieved indoors between 1865 and 1880. Most Poor Law unions were ultimately neither out-and-out Crusade unions nor out-and-out non-Crusade unions, and there was significant inter- and intra-regional varia-

[7]The Goschen Minute was named for its author, the then-President of the Poor Law Board, George Goschen.

tion in the extent to which Poor Law unions eliminated outdoor relief.

2.2.2 The Workhouse Effect

In this essay, I use variation in the change in the fraction of paupers relieved indoors between 1865 and 1880 across Poor Law unions to identify the effect of the workhouse on welfare caseloads. This "workhouse effect" can be decomposed into (*i*) a *screening effect* and (*ii*) a *deterrence effect*.

Screening Effect. I define the screening effect of workhouses as the extent to which they screened the not-actually-needy from relief rolls. Nichols & Zeckhauser (1982), for example, cite the capacity of "ordeals," such as work requirements, to enhance the target efficiency of relief programs in an environment in which administrators have imperfect information about the circumstances of relief applicants [86].[8] Only applicants for whom the marginal benefit of a unit of relief is relatively large will accept an "ordeal" in exchange for relief, while "imposters...masquerading as low-ability individuals" (for whom the marginal benefit of a unit of relief is smaller than the marginal cost of the work required to obtain an equivalent unit of income) will reject the relief and the ordeal on which the relief is made conditional [86, pp. 372, 367-377]. In this way, the workhouse was a means-test. Poor Law guardians did not, and could not, know the circumstances of every relief applicant, but were required to offer relief to all applicants that appeared needy.

[8]The shift of the administration of the Poor Law from the hyper-local parish to the relatively less local Poor Law union rendered the relationship between relief administrators and relief applicants increasingly anonymous. Before 1834, the circumstances of many relief applicants in many parishes were well known to overseers via first-hand experience or local social networks. After 1834, this was less common. The average Poor Law union consisted of 22 parishes, 54,816 acres, 28,708 persons, and 1,302 paupers in 1857. The workhouse provided an alternative method to determine the circumstances of unfamiliar relief applicants. See [19] and [20].

Deterrence Effect. I define the deterrence effect of workhouses as the extent to which they deterred individuals from behavior that would, over time, make them needy. Many English reformers believed that any "shelter deliberately made into a place of horror" would disincentivize intemperance, immoderation, and profligacy, and, in so doing, would prevent would-be paupers from becoming dependent in the first place [91, p. 102]. It was "individual moral failing," they believed, that was the primary cause of poverty [56, p. 215]. In this way, the workhouse was a threat. The likelier it was that an applicant, if relieved, would be relieved a workhouse, the more credible this threat would be.

Reformers predicted that the screening and deterrence effects would, together, if not eliminate pauperism, at least markedly reduce it. Raw data suggest that they were correct—that the "workhouse effect" was, in fact, large. Figure 2.3 demonstrates that as the fraction of paupers relieved indoors increased precipitously and nearly monotonically (38.8 percent between 1868 and 1880 on average across all Poor Law unions), the pauperism rate decreased precipitously and nearly monotonically (31.1 percent between 1868 and 1880 on average across all Poor Law unions). Figure 2.4, moreover, demonstrates that this decrease in pauperism was not an artifact of the business cycle—pauperism and unemployment were roughly acyclical. The estimated unemployment rate decreased by 6.0 percentage points between 1868 and 1872 and increased by 5.4 percentage points between 1872 and 1880. Englanders living on the knife's edge between indigence and subsistence, for whom the loss of employment would have been catastrophic, neither appeared in relief rolls en masse during economic contractions, nor disappeared from relief rolls en masse during economic expansions.

Figures 2.5 and 2.6 decompose the English pauperism rate between 1857 and 1885 into its component parts. The former distinguishes between indoor relief and outdoor relief. It demonstrates that the decline in pauperism was driven by a decline in outdoor relief. Approximately 642,000 paupers were relieved outdoors in 1857 and approximately 518,000 paupers were relieved outdoors in 1885. The latter distinguishes between three classes of paupers: (*i*) the *able-bodied*, (*ii*) the *non-able-bodied*, and (*iii*) *lunatics, insane persons, and idiots*. It demonstrates that the decline in outdoor relief was common to both the able-bodied and the non-able-bodied. The small but persistent increase in the rate of outdoor relief to "lunatics" is largely a matter of accounting. Relief to "lunatics" in union-operated asylums was considered outdoor relief, even though union-run asylums were effectively specialized workhouses—inmates of asylums did not receive cash or in-kind transfers. The increase in the rate of outdoor relief to "lunatics" was, nevertheless, independent of the effect of the Crusade.

Was the workhouse effect large enough to reduce total relief costs? The answer is not straightforward. The cost per pauper of indoor relief was approximately 50 percent greater than the cost per pauper of outdoor relief.[9] Indoor relief required land on which to build a workhouse, labor and other inputs with which to maintain a workhouse, and personnel with whom to operate a workhouse. Figure 2.7, which plots expenditure statistics published by the Poor Law Board and the Local Government Board, yields ambiguous conclusions. Between 1870 and 1880, nominal expenditures on indoor and outdoor relief decreased by 13 percent, real expenditures on indoor and outdoor relief decreased

[9]MacKinnon (1987) estimates that the average annual cost of outdoor relief was between £2.5 and £5.5 per pauper and that the average annual cost of indoor relief was between £5.5 and £20 per pauper. Also note that while unions were responsible for "the complete maintenance" of indoor paupers (i.e., room and board), relief to outdoor paupers often only supplemented "whatever other income the pauper received, or was assumed to receive." See [74, p. 608] and [101, p. 4].

by 9.5 percent, and total real expenditures (including the costs associated with workhouse construction, maintenance, and personnel) increased by 5.5 percent. MacKinnon (1987) calculates that the elasticity of the pauperism rate with respect to the fraction of paupers relieved indoors must be greater than approximately 0.20 in order for the workhouse to have reduced relief expenditures [74].[10] I estimate this elasticity in the following section.

2.3 Empirical Analysis

2.3.1 Data & Summary Statistics

I construct a panel dataset of 576 English Poor Law unions between 1857 and 1885 using Decennial Census Reports, the British Parliamentary Papers, Local Government Directories, and a variety of other publications. A detailed description of the way in which this dataset is constructed (and the precise source or sources from which each variable is derived) can be found in the Data Appendix. Variables included are population, population density (i.e., population per acre), the pauperism rate (i.e., paupers per population), the fraction of paupers relieved indoors (i.e., indoor paupers per total paupers), the percent of adults working in agriculture, workhouse capacity, and the average agricultural laborer's wage (by county). I also obtain the percent of adults working in "manufacturing" in 1851, the percent of adults working in "industry" in 1861,

[10] MacKinnon (1987) calculates a separate elasticity threshold for each English census division (of which there were ten). A rough average of these regional estimates, excluding Metropolitan London, is 0.15. I round this average to 0.20 because her calculations omit many costs associated with indoor relief (i.e., land, labor, raw materials, personnel). I demonstrate in Section 2.3.2 that this is a significant omission.

the sanitary condition of workhouses in 1867 (i.e., whether the workhouse had a ventilation deficiency, a water supply deficiency, or a general sanitary deficiency), and the diet of able-bodied male workhouse inmates in 1864-68 (i.e., the average number of calories and grams of fat, protein, and carbohydrates consumed each day) in each English Poor Law union. Lastly, I obtain the poor rate levied in 1856 in each English parish and the Poor Law unions in which these parishes were situated.

Tables 2.1 and 2.2 present summary statistics by English census division. Population was growing overall and in every census division between 1851 and 1891, but most rapidly in the high-wage, industrial north where coal extraction and cotton-textile production was concentrated (i.e., Census Divisions VIII, IX, and X). This is also true of the fraction of paupers relieved indoors and of workhouse capacity. With the exception of Metropolitan London, the Crusade Against Outrelief was disproportionately, but not exclusively, a northern, urban phenomenon. Likewise, large-scale workhouse construction, renovation, and/or expansion was especially necessary in Poor Law unions in which total population and the fraction of that population relieved in workhouses was growing especially rapidly, hence workhouse construction, renovation, and/or expansion was also disproportionately a northern, urban phenomenon.

In the analysis that follows, I discard all 29 Metropolitan London Poor Law unions (i.e., Census Division I). I do so for three reasons. First, the *Return of Poor Law Inspectors* (1868), from which I obtain the capacity of workhouses in 1867, does not include Metropolitan London. Second, many Metropolitan London Poor Law unions were either dissolved and incorporated into other Poor Law unions or divided to form new Poor Law unions between 1857 and 1885.[11]

[11]The Clerkenwell Poor Law union and the St. Luke's Poor Law union, for example, were

Third, Metropolitan London Poor Law unions were not entirely autonomous. The Metropolitan Poor Act of 1867 required that all expenses for the salaries of officers, for the maintenance of patients in asylums, for the maintenance of pauper children in licensed schools, and for a number of other purpose, be paid out of a "Metropolitan Common Poor Fund," into which every Metropolitan London Poor Law union was required to contribute.[12] This makes these unions improper units of observation.

2.3.2 OLS Model

How effectively did workhouses screen and/or deter would-be paupers from relief rolls? And did they, in fact, cut costs? MacKinnon (1987) suggests that they did. In this section, I replicate her OLS model, illustrate some identification concerns associated with this model, and illustrate some additional concerns associated with workhouse capacity data. Formally, I estimate the following equation.

$$\text{PRTE}_u = \alpha_0 + \alpha_1 \text{INFRAC}_u + \alpha_2 \mathbf{X}_u + \epsilon_u \tag{2.1}$$

The subscript u indexes Poor Law unions. PRTE_u denotes the pauperism rate in Poor Law union u in 1870, INFRAC_u denotes the fraction of paupers relieved indoors in Poor Law union u in 1870, $\mathbf{X}_u$ is a vector of union-specific covariates (viz., population density in 1871, the percent of adults employed in agriculture

dissolved and incorporated into the Holburn Poor Law union in 1868.

[12] See Glenn (1867) for a complete list of expenses to be paid out the Metropolitan Common Poor Fund [46, pp. 35-38]. These expenses included the maintenance costs of patients in Metropolitan asylums, the maintenance costs of pauper children in licensed schools, and the salaries of workhouse officers employed by Metropolitan boards of guardians.

in 1871, the percent of adults employed in manufacturing in 1871, the average agricultural laborer's wage in 1870, and the rate of population growth between 1861 and 1871), and ϵ_u is an error term.[13] All observations are weighted by population and all variables are in logarithms. The coefficient of interest is α_1—the elasticity of the pauperism rate with respect to the fraction of paupers relieved indoors. If, for example, $\alpha_1 = 0$, then *all* relief applicants to whom the workhouse was offered accepted the offer, and the Crusade was perfectly ineffective. If, on the other hand, $\alpha_1 = -1$, then *no* relief applicants to whom the workhouse was offered accepted the offer, and the Crusade was perfectly effective (and, for that matter, workhouses were empty).

Column (1) of Table 2.3 reports the results of Equation 2.1, all of which are roughly consistent with MacKinnon's (1987) results. I find that a 10 percent increase in the fraction of paupers relieved indoors would have reduced the pauperism rate by 3.72 percent (i.e., $\hat{\alpha}_1 = -0.372$). Since the average non-Metropolitan London Poor Law union had 30,378 persons in 1865, relieved 1,312 paupers in 1865, relieved 11.7 percent of paupers indoors in 1865, and relieved 17.7 percent of paupers indoors in 1880 (a 51.1 percent increase), $\hat{\alpha}_1$ implies that the average Poor Law union relieved 249 fewer total paupers in 1880 than it did in 1865 as a result of the Crusade. Since, furthermore, 0.372 exceeds MacKinnon's (1987) 0.20 threshold by nearly 90 percent, $\hat{\alpha}_1$ also implies that the workhouse was extraordinarily cost-effective.

Unfortunately, $\hat{\alpha}_1$ is fraught with potential biases. Among these potential biases are (*i*) *simultaneity bias* and (*ii*) what I will call *workhouse constraint bias*. There is evidence of both. If, for example, high rates of pauperism *caused* sup-

[13] Average agricultural wage estimates are county-level estimates, therefore every Poor Law union within a county will share an average agricultural wage [23].

port for supposed cost-cutting measures such as the Crusade, and if, in turn, this support *caused* high rates of workhouse use, then $\hat{\alpha}_1$ will be biased toward zero. Figure 2.8 demonstrates that Poor Law unions with relatively high rates of pauperism in 1865 were likelier than Poor Law unions with relatively low rates of pauperism in 1865 to increase the fraction of paupers that they relieved indoors between 1865 and 1880. This is evidence of simultaneity bias. If, for example, some significant proportion of workhouses were "full" at a given time and, therefore, some significant proportion of relief applicants to whom indoor relief *would have* been offered was instead, out of necessity, offered outdoor relief, then $\hat{\alpha}_1$ will be biased away from zero. INFRAC_u would fall as relief applicants, for whom indoor relief was unavailable, piled up, and the relationship between INFRAC_u and PRTE_u would no longer reflect the *effect* of INFRAC_u on PRTE_u. Relief applicants piled up most rapidly during periods of high population growth and during recessions.[14] Panel A of Table 2.4 decomposes $\hat{\alpha}_1$ by population growth. It demonstrates that Poor Law unions with relatively high rates of population growth yield a much higher estimate of $\hat{\alpha}_1$ than do Poor Law unions with relatively low rates of population growth. Panel B of Table 2.4 decomposes $\hat{\alpha}_1$ by year. It demonstrates that a recession year (i.e., 1863) yields a much higher estimate of $\hat{\alpha}_1$ than years of relative prosperity (i.e., 1865, 1870, 1880, and 1885). This is evidence of workhouse constraint bias.

How full were workhouses before the Crusade? Williams (1981) claims that the Crusade would have been impossible without the considerable "construction programme" that occurred [114, pp. 87-88].[15] Figure 2.9 corroborates this

[14]For a given application rate (applications per population), population growth generates more applications mechanically.

[15]Workhouse construction was slow. Consider, for example, the case of the St. Martin-in-the-Fields Poor Law union. In August of 1866, £67,000 was appropriated to the St. Martin-in-the-Fields Poor Law union by the National Gallery Enlargement Act for the construction of a new, larger workhouse. Between August of 1866 and May of 1867, land was purchased in

point. Workhouses in more than one-in-six Poor Law unions were at least 70 percent full on July 1st, 1857, and these Poor Law unions accounted for 31 and 37 percent of all English paupers and persons, respectively. Figure 2.10 demonstrates that workhouses in Poor Law unions in which the fraction of paupers relieved indoors increased markedly between 1857 and 1880 were likelier to be full in 1857—and likelier to be expanded or rebuilt between 1857 and 1880—than workhouses in Poor Law unions in which the fraction of paupers relieved indoors increased only slightly, remained unchanged, or decreased between 1857 and 1880. And workhouse construction was not cheap. Between 1857 and 1871, the Poor Law Board authorized £1,264,746 to be spent on the erection of new workhouses that, combined, would hold 34,204 paupers, and an authorized additional £2,559,236 to be spent on the "alteration or enlargement" of existing workhouses. This amounts to £37 per pauper accommodation (or approximately $4,000 in 2017 U.S. dollars).[16]

Workhouses might have been even "fuller" than my dataset suggests. I discuss three ways that my dataset understates the extent to which workhouses were actually space-constrained below.

Workhouse Seasonality. Between 1857 and 1885, no fewer than one-in-ten English adults worked in agriculture in any given year, and no fewer than one-in-three English adults worked in agriculture in any given year in the 165 most agriculturally-oriented Poor Law unions.[17] Since agricultural work was

Wimbledon, a committee was appointed to "consider the requirements of the new workhouse," and a "rough sketch" of the new workhouse was submitted to the Poor Law Board. When, in March of 1868, the St. Martin-in-the-Fields Poor Law Union was subsumed by the adjacent Strand Poor Law Union, a workhouse architect had yet to be appointed. It was not until June of 1869 that what remained of the £67,000 was re-appropriated to Parliament by the St. Martin-in-the-Fields Workhouse Fund Appropriation Act. See [96, p. 305] and [13, p. 577].

[16]See *Reports of the Poor Law Board* (1858-71) and *Report of the Local Government Board* (1872).

[17]By agricultural orientation, I mean the percent of adults working in "agricultural production."

seasonal, pauperism in agriculturally-oriented Poor Law unions was seasonal. During the harvest, pauperism rates were relatively low. After the harvest, pauperism rates were relatively high—as employment opportunities waned, any unnecessary agricultural laborers were compelled to find other work (often in the city), live off of the few savings that they might have accumulated, or seek relief (either private or public). The average Poor Law union, for example, relieved 4.7 percent more paupers and 15.6 percent more indoor paupers on January 1st of 1881 than it did on July 1st of 1881. Since my dataset consists only of day-counts of paupers relieved on July 1st of each year, it omits any off-harvest surge in pauperism and, therefore, systematically understates the extent to which workhouses in agriculturally-oriented Poor Law unions were, on average, space-constrained throughout the year.[18]

Workhouse Inmate Distribution. Poor Law unions were required by the Consolidated General Order of 1847 to provide "proper accommodation" for seven classes of inmates "on moral and medical grounds" [99, p. 35].[19] Proper accommodation meant that each class was assigned to "that ward or separate building and yard which may be best fitted for [its] reception...without communication with those of any other class" [47, p. 69]. Men were separated from women. Adults were separated from children. The able-bodied were separated from the infirm. Workhouses, therefore, "may [have been] crowded in certain parts, while the total number of inmates may [have been] far below the tolerated max-

[18] *Poor Rates and Pauperism* (1857-85), from which I obtain the number of paupers relieved in each Poor Law union, was published bi-annually. The first report published each year enumerated the number of paupers relieved on January 1st and the second report published each year enumerated the number of paupers relieved on July 1st.

[19] The seven classes enumerated in the Consolidated General Order were: (*i*) infirm men, (*ii*) able-bodied men and boys above fifteen years of age, (*iii*) boys between seven and fifteen years of age, (*iv*) infirm women, (*v*) able-bodied women and girls above fifteen years of age, (*vi*) girls between seven and fifteen years of age, and (*vii*) children of both sexes under seven years of age.

imum."[20] Since my dataset does not account for the capacity of class-specific wards within workhouses, it systematically understates the extent to which the fullest wards were space-constrained.

Workhouse Quality. MacKinnon (1987) proposes that "the quality of workhouse facilities would influence the public acceptance of an apparently harsh policy. Where workhouses were seen to be excessively unsanitary and badly run, forcing...the poor to enter the workhouse to obtain relief would encounter considerable opposition" [74, p. 605]. The London infirmary scandals of the 1860s exposed the English public to the less than hygienic and, in some cases, less than habitable conditions within Metropolitan London workhouses. There is reason to believe that workhouse habitability problems were hardly an exclusively Metropolitan London problem [54, p. 465].[21] Figure 2.11 demonstrates that approximately one-in-five workhouses was deficient in ventilation, in water supply, or in general sanitation. Table 2.5 demonstrates that workhouse diets were monotonous and often insufficient—the average able-bodied male workhouse inmate received only 1,933 calories per day, almost half of which came from bread.[22] If the English public was, in fact, aware of and antipathetic toward these workhouse deficiencies, then Poor Law unions may have been politically incapable of filling their workhouses to capacity, or too close to capacity, lest they exacerbate the perception of workhouses as inhumane. Since my dataset does not account for English public opinion, it may systematically understate the actual, politically-acceptable capacity of workhouses (as distinguished from the official, physical capacity of workhouses).

[20] *Return of Poor Law Inspectors* (1868).

[21] *The Lancet* reported in in March of 1868 that "the national sense of humanity was deeply shocked [by the London infirmary scandals], and arousing from its usual apathy on pauper misery, society united in a determined effort to redress the evil" [12].

[22] See Gazeley & Horrell (2013) for a discussion of "basic subsistence" [45, p. 767].

2.3.3 Difference-in-Differences Model

In this section, I introduce a difference-in-differences model (that overcomes the two biases associated with the OLS model introduced in the previous section), discuss my identification strategy, and report and interpret the results of this model. My empirical strategy exploits variation in the *change* in the fraction of paupers relieved indoors between 1865 and 1880—the "Crusade years"—across Poor Law unions to identify the effect of workhouse use on pauperism. Figure 2.12 illustrates this variation. The fraction of paupers relieved indoors increased by less than 50 percent in 280 Poor Law unions, by between 50 and 100 percent in 143 Poor Law unions, and by more than 100 percent in 127 Poor Law unions. Formally, I estimate the following equation.

$$\begin{aligned} \text{PRTE}_{ut} = \beta_0 + \beta_1(\%\text{INFRACCHANGE}_u \times \text{POST}_t) \\ + \beta_2 \mathbf{X}_{ut} + \gamma_u + \mu_t + \epsilon_{ut} \end{aligned} \tag{2.2}$$

The subscript u indexes Poor Law unions and the subscript t indexes years (i.e., 1857, 1865, 1880, and 1885). $\%\text{INFRACCHANGE}_u$ denotes the percent change in the fraction of paupers relieved indoors between 1865 and 1880 in Poor Law union u, POST_t is a dummy that takes a value of 1 if $t \geq 1880$ and 0 otherwise, γ_u are Poor Law union fixed-effects, and μ_t are year fixed-effects. All other variables are defined as in Equation 2.1. All observations are weighted by population and all variables except $\%\text{INFRACCHANGE}_u$ and POST_t are in logarithms. The coefficient of interest is β_1—the elasticity of pauperism with respect to the fraction of paupers relieved indoors.

Column (2) of Table 2.3 reports the results of Equation 2.2. I find that a 10

percent increase in the fraction of paupers relieved indoors would have reduced the pauperism rate by 2.64 percent (i.e. $\hat{\beta}_1 = -0.264$). This estimate is large. But it is considerably smaller than the OLS estimate from the previous section. $\hat{\beta}_1$, therefore, suggests that $\hat{\alpha}_1$ is biased upward, and that the Crusade was less cost-effective than presumed—note that it exceeds (in absolute value) MacKinnon's (1987) 0.20 threshold by only 32 percent. Columns (3), (4), and (5) of Table 2.3 report the results of three alternate specifications of Equation 2.2 that attempt to account for sectorial, regional, and local employment shocks unaccounted for by year fixed-effects. Column (3) includes interactions of year dummies with two sectorial dummies (i.e., coal and cotton-textiles). Column (4) includes interactions of year dummies with three regional dummies (i.e., north, south, and midlands). Column (5) includes the rate of population change.[23] $\hat{\beta}_1$ is robust across these specifications.

It is clear from Tables 2.1 and 2.2 that *levels* of INFRAC_u were not randomly assigned (statistically speaking) to Poor Law unions. Industrial Poor Law unions had, on average, higher levels of INFRAC_u than non-industrial Poor Law unions. It is, moreover, clear from Figure 2.8 that *changes* in INFRAC_u were not randomly assigned (statistically speaking) to Poor Law unions. Poor Law unions with relatively high rates of pauperism in 1865 had, on average, greater percent-increases in INFRAC_u (i.e., $\%\text{INFRACCHANGE}_u$) between 1865 and 1880 than Poor Law unions with relatively low rates of pauperism in 1865. But identification of β_1 requires neither the random assignment of INFRAC_u nor the random assignment of $\%\text{INFRACCHANGE}_u$. It requires, rather, that $\%\text{INFRACCHANGE}_u$ is unrelated to relative pauperism *trends* (not *levels*) before

[23] For 1857, I measure the rate of population change between 1851 and 1861. For 1865, I measure the rate of population change between 1861 and 1871. For 1880, I measure the rate of population change between 1871 and 1881. For 1885, I measure the rate of population change between 1881 and 1891.

1865. Figure 2.13 suggests that this requirement is met. The average pauperism rate among high-%INFRACCHANGE$_u$ Poor Law unions trended very nearly identically to the average pauperism rate among low-%INFRACCHANGE$_u$ Poor Law unions prior to 1865 (with the notable exception of the years 1861-65). The large asymmetric spike in average pauperism in the years 1861-65 is an artifact of the Lancashire Cotton Famine—a short but severe recession concentrated in Lancashire and Cheshire.[24] Figure 2.14, which re-plots Figure 2.13 omitting the 37 cotton-oriented Poor Law unions in Lancashire and Cheshire, confirms this point: the asymmetric spike disappears. Since Equation 2.2 uses only the years 1857, 1865, 1880, and 1885, the Lancashire Cotton Famine should not bias my results.[25] In order to formally test whether %INFRACCHANGE$_u$ is, in fact, unrelated to relative pauperism trends before 1865, I estimate the following event-study model (which is identical to Equation 2.2 except that it disaggregates POST$_t$ by year).

$$\begin{aligned} \text{PRTE}_{ut} = \kappa_0 + \sum_{\tau} \pi_\tau (\%\text{INFRACCHANGE}_u \times \text{YEAR}_t) \\ + \kappa_1 \mathbf{X}_{ut} + \gamma_u + \mu_t + \epsilon_{ut} \end{aligned} \tag{2.3}$$

The subscript u indexes Poor Law unions and the subscript t indexes years. In this case, I use the years 1857, 1860-66, 1868, 1870, 1872, 1876, 1878, 1880, and 1885. YEAR$_t$ is a dummy that takes a value of 1 if $t = \tau$ and 0 otherwise.

[24] Between 1861 and 1865, during the American Civil War, a Union blockade of Confederate ports dissevered Britain from its principal supplier of raw cotton, "bringing four years of distress to the towns in the cotton manufacturing districts" [60, p. 380]. These districts were concentrated in Lancashire and Cheshire.

[25] Note that by omitting all years between 1865 and 1880, I do not observe Poor Law unions in the midst of the "construction programme" that accompanied the Crusade and, in so doing, I minimize the likelihood of workhouse constraint bias. By 1880, Poor Law unions had already increased (or not increased) the fraction of paupers that they relieved indoors and, therefore, had presumably already accommodated the size of their workhouse to the greater (if greater) number of paupers that they relieved indoors.

All other variables are defined as in Equation 2.2. All observations, as before, are weighted by population, and all variables except %INFRACCHANGE$_u$ and YEAR$_t$ are in logarithms. The coefficients of interest are the set of π_τ. I omit YEAR$_{1870}$, therefore $\hat{\pi}_\tau$ represents the estimated difference between pauperism rates in high-%INFRACCHANGE$_u$ Poor Law unions and pauperism rates in low-%INFRACCHANGE$_u$ Poor Law unions in year τ relative to 1870. Figure 2.15 plots these coefficients. As in Figure 2.13, there is an asymmetric spike in relative pauperism rates in the years 1861-65. Figure 2.16 plots the same coefficients using a re-regression that omits the 37 Poor Law unions in Lancashire and Cheshire. As in Figure 2.14, this spike disappears. Since the pattern of $\hat{\pi}_\tau$ before $\tau = 1865$ is relatively flat and centered around zero, Equation 2.3 suggests that %INFRACCHANGE$_u$ is unrelated to relative pauperism trends before 1865 and, hence, Equation 2.3 suggests that β_1 is identified (i.e., that the parallel trends requirement is met).

What do these results reveal about the decisions of relief applicants to whom the workhouse was offered as a test? What proportion of relief applicants accepted this test? What proportion rejected it? If, in a given Poor Law union, the fraction of paupers relieved indoors increased by $(100 \times \theta)\%$, then some number of relief applicants to whom outdoor relief was offered under the "old" policy would have, instead, been offered indoor relief under the "new" policy. I call these applicants "marginal applicants." I calculate the estimated proportion of marginal applicants that accepted a workhouse offer using the following formula.

$$\%\text{ACCEPT} = \frac{\textit{No. of Marginal Applicants}_{\text{ACCEPT}}}{\textit{No. of Marginal Applicants}_{\text{TOTAL}}} = \frac{\widehat{in} - in}{out - \widehat{out}} \tag{2.4}$$

in and *out* denote the *actual* number of indoor and outdoor paupers relieved in 1865 and $\widehat{in}$ and $\widehat{out}$ denote the *counterfactual* number of indoor and outdoor paupers that would have been relieved in 1865 if the fraction of paupers relieved indoors was $(100 \times \theta)\%$ greater. Note that the number of marginal applicants is equivalent to the difference between the actual and counterfactual number of outdoor paupers (i.e., $out - \widehat{out} \geq 0$) and the number of marginal applicants that accepted indoor relief is equivalent to the difference between the actual and counterfactual number of indoor paupers (i.e., $\widehat{in} - in \geq 0$).[26] I calculate $\widehat{in}$ and $\widehat{out}$ using the following formulae.

$$\begin{aligned} \widehat{in} &= [\widehat{\text{PAUPERS}}] \times [\widehat{\text{INFRAC}}] \\ &= [\text{POP} \times \widehat{\text{PRTE}}] \times [\widehat{\text{INFRAC}}] \\ &= [\text{POP} \times (1 - \hat{\beta}_1\theta) \times \text{PRTE}] \times [(1 + \theta) \times \text{INFRAC}] \end{aligned} \tag{2.5}$$

$$\begin{aligned} \widehat{out} &= [\widehat{\text{PAUPERS}}] \times [1 - \widehat{\text{INFRAC}}] \\ &= [\text{POP} \times \widehat{\text{PRTE}}] \times [1 - \widehat{\text{INFRAC}}] \\ &= [\text{POP} \times (1 - \hat{\beta}_1\theta) \times \text{PRTE}] \times [1 - ((1 + \theta) \times \text{INFRAC})] \end{aligned} \tag{2.6}$$

POP, PAUPERS, PRTE, and INFRAC denote total population, total paupers, total paupers per population, and the fraction of paupers relieved indoors in 1865, respectively. Hats denote counterfactuals. I calculate $\widehat{in}$, $\widehat{out}$, and %ACCEPT for each English Poor Law union using observables, $\hat{\beta}_1$, and $\theta = 0.493$ (the average percent-increase in the fraction of paupers relieved indoors between 1865 and 1880 among English Poor Law unions). I then average %ACCEPT across all English Poor Law unions. The final row of Table 2.3 reports these averages.

[26] I assume that all relief applicants to whom outdoor relief was offered accepted the offer.

I find that one-in-four—between 25.4 and 26.1 percent of—marginal applicants accepted a workhouse offer. This is a significantly larger workhouse acceptance rate than was anticipated by Poor Law authorities. In 1834, for example, an administrator in the Lambeth Poor Law union anticipated that "not...more than one out of five" able-bodied relief applicants would accept a workhouse offer [4]. In 1837, the Poor Law Commission anticipated that "not more than four or five out of a hundred able-bodied paupers, to whom it is offered, will accept relief in the house" [6, p. 114]. In 1872, the Local Government Board anticipated that "not more than one of ten of those, to whom the workhouse is offered as a test, will avail themselves of the offer" [2, p. 95]. The difference between what actually happened and what was anticipated to happen most likely accounts both for the initial enthusiasm of advocates of the Crusade and for the ultimately insignificant savings that the Crusade achieved.

2.3.4 Migration Bias

Did the Crusade affect inter-union migration? If would-be paupers were wont to emigrate *from* Poor Law unions in which the probability of relief in a workhouse increased markedly between 1865 and 1880, or were wont to immigrate *to* Poor Law unions in which the probability of relief in a workhouse increased only slightly, remained unchanged, or decreased between 1865 and 1880, then the estimates presented in Section 2.3.3 will be biased upwards—in this case, some proportion of the contraction in the pauperism rate in "Crusade unions" would represent a reallocation of paupers between Poor Law unions, not a reduction in pauperism. In this section, I discuss the laws that governed the conditions under which migrants were eligible to remain in and receive poor

relief from destination parishes (i.e., the Settlement Laws), the enforcement of these laws (or the lack thereof), and the likelihood that inter-union differences in workhouse use actually engendered inter-union migration.

The Settlement Laws purported to prevent the poor from "settling themselves in those parishes...with the largest commons...and the most woods," but their origins, according to Nicholls (1898), lie in the desire of Metropolitan members of Parliament to consign "the continually increasing number of poor within the cities of London and Westminster" to the country parishes whence they came [85, p. 281]. The most consequential of these Laws, up to and including the period of the Crusade, were as follows.

Settlement and Removal Act of 1662. This Act enabled local magistrates to remove any entrant into their parishes that was "likely to [become] chargeable to the parish...upon complaint made by churchwardens or overseers of the poor...within forty days of [that entrant's] arrival." Even an earnest, industrious laborer "driven from his place by want of work, deficiency of wages, or any other cause [was], on his entering another parish, liable to be seized...on the ground that he [was] likely to be chargeable—his only certain exemption from such liability being the occupation of a tenement of not less than £10 yearly value" [85, p. 283].[27] In effect, any English migrant who *appeared* indigent, or likely to become indigent, could be removed and sent back to his or her parish of birth.

Poor Removal Act of 1795. This Act amended the Settlement and Removal Act of 1662 so that no English migrant "could be removed from a parish unless he

[27]Other, less common exemptions to the Settlement and Removal Act of 1662 included marriage to a resident of the destination parish, holding government office in the destination parish, and employment in the destination parish for more than 365 consecutive days.

[or she] applied to the parish for relief" [24, p. 72]. Removal now required a formal application for relief, not just the appearance of indigence.

Poor Removal Act of 1846. This Act amended the Poor Removal Act of 1795 so that any English migrant could acquire a "settlement" after five years of continuous residency in a destination parish. A settlement entitled parish newcomers to poor relief and protected parish newcomers from removal. Before 1846, no duration of residency was sufficient to guard against removal. Removal now required a formal application for relief before five years had elapsed.

Irremovable Poor Act of 1861. This Act amended the Poor Removal Act of 1846 so that any English migrant could acquire a "settlement" after three years of continuous residency. Removal now required a formal application for relief before three years had elapsed.

Union Chargeability Act of 1865. This Act amended the Irremovable Poor Act of 1861 so that any English migrant could acquire a "settlement" after only one year of continuous residency. Removal now required a formal application for relief before one year had elapsed.

In principle, the Settlement Laws made it extraordinarily risky for ordinary English laborers (who, at some point or another, might have found themselves only one injury, one illness, one bad harvest, or one economic downturn away from penury), to emigrate from the Poor Law unions in which they were born. Few among them could afford to wait for five years, three years, or even one year for poor relief. In practice, however, the Settlement Laws were imperfectly enforced, and inter-union migration was not uncommon [113, p. 149]. Not all relief applicants in contravention of the Settlement Laws were investigated,

"nor was...an investigation always followed by removal, even when there was clear legal ground for it" [51, p. 134]. There were "many loopholes which [prevented] the law from being enforced in its entirety, and research has shown that they were constantly used" [77, p. 39].

In order to impute the characteristics of the migrants who should have been, but were not, removed from the Poor Law unions to which they immigrated, I explore the characteristics of the migrants who were removed from the Poor Law unions to which they immigrated. One Parliamentary report—the *Return of Persons Removed* (1843)—suggests that the overwhelming majority of removed migrants (*i*) travelled a great distance and (*ii*) were employed upon removal.[28] Of the 350 persons removed from the Stockport Poor Law union in 1841, for example, only 130 were born in England and only 31 were born in Cheshire. Of the 98 "households" removed from the Stockport Poor Law union in 1841, only 5 had unemployed "heads" at the time of their removal. Migrants were not, on the whole, local itinerants travelling from Poor Law union to Poor Law union in search of marginally friendlier terms under which to receive poor relief. For the typical migrant, migration was risky, costly, and long-distance. As such, it is unlikely that the Crusade affected inter-union migration.

2.3.5 Triple-Difference Model

Did the workhouse effect vary with workhouse quality? Were relief applicants, for example, more likely to reject relief if the workhouse in which they would be relieved was especially disagreeable? In this section I explore this question using a triple-difference model that incorporates five measures of workhouse

[28] See Parl. Papers, 45 (1843), pp. 5-33.

quality. Formally, I estimate the following equation.

$$\begin{aligned} \text{PRTE}_{ut} = \Omega_0 &+ \Omega_1(\%\text{INFRACCHANGE}_u \times \text{POST}_t \times \text{WHQ}_u) \\ &+ \Omega_2(\%\text{INFRACCHANGE}_u \times \text{POST}_t) \\ &+ \Omega_3(\text{POST}_t \times \text{WHQ}_u) + \Omega_4 \mathbf{X}_{ut} + \gamma_u + \mu_t + \epsilon_{ut} \end{aligned} \tag{2.7}$$

As before, the subscript u indexes Poor Law unions and the subscript t indexes years (i.e., 1857, 1865, 1880, and 1885). WHQ_u denotes one of five measures of workhouse quality: (*i*) an indicator for ventilation deficiency, (*ii*) an indicator for water supply deficiency, (*iii*) an indicator for general sanitation deficiency, (*iv*) average daily calories fed to workhouse inmates, and (*v*) the ratio of the amount of meat fed to workhouse inmates to the estimated amount of meat consumed by "poor labourers" in the county in which the workhouse was situated. All other variables are defined as in Equation 2.2. The coefficient of interest is Ω_1—the difference between the workhouse effect in Poor Law unions with quality-deficient workhouses and the workhouse effect in Poor Law unions with quality-sufficient workhouses. Note that each of these five distinct triple-difference regressions uses only the subset of English Poor Law unions for which WHQ_u is available.[29]

Table 2.6 reports the results of Equation 2.7. The signs of the estimates suggest that workhouse quality mattered—that the workhouse effect was greater in Poor Law unions in which the workhouse was deficient in ventilation (Ω_1^{vnt} =

[29]The *Return of Poor Law Inspectors* (1868) yields information about the sufficiency of the ventilation in 324 workhouses (and 321 non-Metropolitan workhouses), about the sufficiency of the water supply in 324 workhouses (and 321 non-Metropolitan workhouses), about the general sanitary condition in 235 workhouses (all of which are non-Metropolitan workhouses), about the diets consumed by inmates in 180 workhouses (and 177 non-Metropolitan workhouse), and about the amount of meat consumed by inmates in 180 workhouses (and 177 non-Metropolitan workhouses). See Data Appendix for a more thorough discussion of these data.

-0.232) or water supply ($\Omega_1^{wtr} = -0.061$) and smaller in Poor Law unions in which the diets of workhouse inmates were richer in calories ($\Omega_1^{cal} = 0.070$) or meat ($\Omega_1^{meat} = 0.062$). But none of the estimates of Ω_1 are statistically distinguishable from zero at a 95 percent confidence level. This result (i.e., $\Omega_1 = 0$) is consistent with a stigma-type story of welfare—that it was the indignity of entering the workhouse, not the quality of the workhouse, that screened and/or deterred would-be paupers from relief rolls. That the workhouse effect did not, according to my estimates, depend upon workhouse quality corroborates Moffit's (1983) conclusion that "stigma appears to arise mainly from the act of welfare recipiency per se, and not to vary with the amount of the benefit" [84, pp. 1033-1034].

2.3.6 What Caused the Crusade?

Little has been written about why the Crusade occurred when it did. MacKinnon (1987) hypothesizes that the Union Chargeability Act of 1865, which equalized poor rates across parishes within Poor Law unions, galvanized support among taxpayers, especially affluent taxpayers, for policies that might offset the excess tax burden they stood to bear. Rate equalization meant that relatively rich parishes (in which there was a relatively large tax base and/or a relatively small number of relief recipients) subsidized relatively poor parishes (in which there was a relatively small tax base and/or a relatively large number of relief recipients).[30] Poor rates in relatively rich parishes rose. Poor rates in relatively poor

[30]Before 1865, each parish contributed to the common fund of the Poor Law union to which it belonged in proportion to the number of paupers that it sent to the workhouse (and was responsible for its own outdoor relief). The Union Chargeability Act of 1865 eliminated the common fund and, with it, proportional parish poor rates. After 1865, each parish in each Poor Law union paid the same poor rate. The years 1861 through 1865 were unusual exceptions. The

parishes fell. If the English upper class felt disproportionately disadvantaged by the Act—as, in fact, it was—and if it responded to this disproportionate disadvantage by wielding its disproportionate political power to restrict outdoor relief, then there would have been a relationship between the distribution of wealth across parishes within Poor Law unions *before* 1865 and the change in workhouse use by Poor Law unions *after* 1865.[31] My dataset enables a direct test of this hypothesis. Formally, I estimate the following equation.

$$\%\text{INFRACCHANGE}_u = \theta_0 + \theta_1 \text{UCA}_u + \theta_2 \mathbf{X}_u + \epsilon_u \tag{2.8}$$

As before, the subscript u indexes Poor Law unions. UCA_u denotes one of two measures of the impact of the Act: (*i*) the standard deviation of parish poor rates in Poor Law union u in 1856, which proxies the *overall* impact of the Act on Poor Law union u, and (*ii*) the difference between the minimum parish poor rate levied in Poor Law union u in 1856 and the poor rate that would have prevailed in Poor Law union u in 1856 under so-called "union chargeability," which proxies the impact of the Act on the *richest* and, presumably, most politically influential parish in Poor Law union u. All other variables are defined as in Equation 2.2. The coefficient of interest is θ_1—the effect of pre-1865 poor rate dispersion on post-1865 Crusade adoption.

Table 2.7 reports the results of Equation 2.8. They suggest that there was no relationship—or, at least, only a negligible relationship—between the Act

Poor Removal Act of 1861 required that each parish contribute to the common fund of the Poor Law union to which it belonged in proportion to its *rateable value* (i.e., property wealth), not in proportion to the number of paupers that it sent to the workhouse.

[31] According to MacKinnon (1987), the Union Chargeability Act generated "the incentive for wealthier groups to consider more carefully how to reduce relief expenditures" [74, p. 613]. Note that Poor Law guardians were almost always wealthy since the Poor Law Amendment Act of 1834 imposed a property qualification on candidacy for election to the board.

and the Crusade. If the Act *did* cause the Crusade, then $\hat{\theta}_1$ should be large and statistically significant. It is neither. A one-standard-deviation increase in parish poor rate dispersion is associated with a 0.4 percent increase in the fraction of paupers relieved indoors ($\hat{\theta}_1^{std} = 0.004$). A ten-percentage-point increase in the tax rate of the least-taxed parish is associated with a 3.0 percent increase in the fraction of paupers relieved indoors ($\hat{\theta}_1^{rich} = 0.003$). Figure 2.17, furthermore, demonstrates that the Act had little impact north of the River Trent, where, in industrial Poor Law unions in Lancashire, Cheshire, Yorkshire, and Durham, the Crusade was very popular. This evidence is hardly dispositive—it does not rise to the level of causal evidence—but it is, perhaps, a persuasive first pass.

2.4 Conclusion

The Poor Law Amendment Act of 1834 endowed all English Poor Law unions with the administrative power (and the legislative mandate) to restrict the ease with which poor relief could be obtained by applicants. Between 1834 and 1865, there was little substantive change. Between 1865 and 1880, many, but not all, Poor Law unions began to exercise this power, some to a greater degree than others. This policy revolution—the Crusade Against Outrelief—is a useful natural experiment from which a number of lessons can be learned. What is the relationship, for instance, between the conditions attached to welfare recipiency and the overall rate of welfare recipiency? Do these conditions, on balance, reduce relief costs? Does this relationship depend on the nature or the severity of these conditions? And what might cause such a revolution in the first place? I address each of these questions in this essay.

First, I find that the workhouse was *very* effective. Nearly three-quarters of relief applicants to whom the workhouse was offered as a test refused the offer. But it was also very costly. Workhouse construction costs, maintenance costs, and personnel costs all but offset the savings associated with slimmer relief rolls. In this way, the Crusade was a political success and an economic failure. Though there were fewer paupers, paupers and would-be paupers were unambiguously worse off, and taxpayers were only ambiguously better off. Second, I find that the decision to accept or reject a workhouse offer was independent of the disagreeableness of the workhouse. Relief applicants were no less likely to accept a workhouse offer if the workhouse in which they would be relieved was deficient in ventilation, water supply, general sanitation, or diet. It was the stigma of entering the workhouse, not the disagreeableness of workhouse life, that screened and/or deterred relief applicants from relief rolls. Public exposure as "a pauper" was undoubtedly difficult, and that was the point of the Crusade, however cruel. But if workhouses worked because they branded their inmates with scarlet "P"s, then workhouses need not have been as inhumane as they were to function effectively. Lastly, I find no evidence that the Union Chargeability Act of 1865 was the cause—or even *a* cause—of the Crusade. The Poor Law unions most affected by union chargeability did not, on average, behave any differently in the ensuing fifteen years than the Poor Law unions least affected by union chargeability. If the Crusade was, as it claimed, a matter of pounds, shillings, and pence, it remains to be shown what, precisely, changed in the late 1860s that so challenged the pocketbooks of its advocates.

The most significant—and surprising—finding of this essay is just how large the workhouse effect was. The English working class in the middle of the nineteenth century was extraordinarily poor by today's standards. Rowntree (1901),

for example, finds that nearly half of the "wage-earning class" of the city of York was living in either "primary poverty" or "secondary poverty" as late as 1901.[32] Yet the Crusade successfully excised a subset of this class—the most vulnerable subset of this class—from relief rolls in large numbers. An equivalent welfare reform in England today—or in any affluent, twenty-first century society—would almost certainly excise an even *larger* subset. With far fewer people living at or below the poverty line (as defined by Rowntree), far fewer people are living without savings on which to fall back. The average Victorian laborer had little, if any, savings, but three-in-four to whom the workhouse was offered still said "no."

[32]Rowntree (1901) defines *primary* poverty as "families whose total earnings are insufficient to obtain the minimum necessaries for the maintenance of merely physical efficiency" and *secondary* poverty as "families whose total earnings would be sufficient for the maintenance of merely physical efficiency were it not that some portion of them is absorbed by other expenditure, either useful or wasteful" [98, pp. 86-87]. He finds that 27.84 percent and 45.77 percent of wage-earners in York were living in primary and secondary poverty, respectively, in 1901.

2.5 Tables & Figures

Table 2.1: Union Demographic & Industrial Statistics (by Census Division)

	Metro London (1)	South Eastern (2)	South Midland (3)	Eastern (4)	South Western (5)	West Midland (6)	North Midland (7)	North Western (8)	Yorkshire (9)	Northern (10)	All England (11)
Panel A. Population (in 1,000s)											
1851	87.3	16.5	19.2	20.6	22.6	26.2	27.5	68.6	30.0	25.3	**28.7**
1861	103.8	18.8	20.5	21.1	23.2	29.9	29.2	81.2	33.9	30.3	**32.3**
1871	120.4	22.3	22.5	22.6	24.3	33.3	32.1	95.0	40.7	37.5	**36.9**
1881	141.3	25.8	24.9	25.3	23.4	37.0	37.2	112.1	47.7	45.1	**42.0**
1891	156.0	29.7	29.7	29.2	24.2	40.2	41.1	128.0	52.9	52.7	**47.0**
Panel B. Percent Manufactures/Industry †											
1851	5.73	2.36	7.58	3.08	4.73	4.78	5.39	20.24	9.96	3.43	**5.97**
1861	35.31	20.55	28.11	20.43	26.81	30.41	30.44	42.06	31.32	30.77	**28.16**

Table 2.1: *Cont'd*

	Metro London (1)	South Eastern (2)	South Midland (3)	Eastern (4)	South Western (5)	West Midland (6)	North Midland (7)	North Western (8)	Yorkshire (9)	Northern (10)	All England (11)
Panel C. Percent Agriculture											
1851	1.49	25.30	27.17	29.30	27.70	23.15	24.82	13.72	24.63	23.13	**23.80**
1861	1.67	23.56	26.25	30.01	25.86	22.78	25.84	13.46	24.40	21.12	**23.09**
1881	0.74	22.81	26.71	33.81	25.40	21.69	22.92	8.45	22.62	18.34	**22.22**
Panel D. Cotton-Textile Production											
1851	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.61	0.13	0.13	**0.07**
Panel E. Coal Production											
1851	0.00	0.00	0.00	0.00	0.05	0.40	0.14	0.31	0.15	0.66	**0.15**

Table 2.1: *Cont'd*

	Metro London (1)	South Eastern (2)	South Midland (3)	Eastern (4)	South Western (5)	West Midland (6)	North Midland (7)	North Western (8)	Yorkshire (9)	Northern (10)	All England (11)
Panel F. Agricultural Wage											
1850	10.74	9.90	8.87	7.89	8.14	8.14	10.08	13.13	12.76	11.55	**9.72**
1861	12.70	11.76	10.99	11.23	9.37	10.58	12.82	13.00	12.49	13.94	**11.53**
1870	13.16	12.52	11.43	11.70	9.78	11.77	13.16	14.52	14.51	15.91	**12.45**
1880	15.12	13.81	13.29	12.50	12.41	13.37	14.14	16.96	16.24	17.96	**14.15**
Obs.	27	95	64	54	78	87	44	36	53	38	**576**

Source: Decennial Census Reports (1851-91), *Poor Rates and Pauperism* (1857, 62), *Great Britain Historical GIS Project* (2011), [23].

Notes: Panels A, B, and C report the average population, the average percent of adults working in manufactures/industry, and the average percent of adults working in agriculture across English Poor Law unions. Panels D and E report the percent of Poor Law unions for which coal or cotton-textile production was a "special occupation." Panel F reports the average weekly wage paid to agricultural laborers across English counties. See Data Appendix for a complete list of census divisions and the registration counties of which they were composed.

† Occupational classes and sub-classes were re-organized between the 1851 and 1861 Census Reports. The 1851 measure of "manufactures" is narrower than the 1861 measure of "industry." The former measure, for instance, excludes "persons working and dealing in minerals," such as miners (e.g. coal, gold, copper, tin, lead) and quarriers. See Data Appendix for a complete list of occupational classes and sub-classes included in "manufactures" in 1851 and "industry" in 1861.

Table 2.2: Union Pauperism & Workhouse Statistics (By Census Division)

	Metro London (1)	South Eastern (2)	South Midland (3)	Eastern (4)	South Western (5)	West Midland (6)	North Midland (7)	North Western (8)	Yorkshire (9)	Northern (10)	All England (11)
Panel A. Pauperism Rate											
1857	0.034	0.055	0.057	0.066	0.063	0.045	0.040	0.032	0.035	0.038	**0.049**
1865	0.035	0.051	0.056	0.064	0.063	0.045	0.042	0.027	0.033	0.037	**0.048**
1880	0.027	0.033	0.039	0.042	0.049	0.035	0.029	0.021	0.026	0.027	**0.035**
1885	0.027	0.030	0.035	0.039	0.043	0.033	0.028	0.019	0.025	0.026	**0.032**
Panel B. Fraction of Paupers Relieved Indoors (i.e. INFRAC)											
1857	0.31	0.17	0.12	0.11	0.10	0.11	0.12	0.14	0.11	0.10	**0.13**
1865	0.31	0.15	0.11	0.11	0.10	0.11	0.11	0.15	0.12	0.10	**0.13**
1880	0.55	0.22	0.17	0.16	0.13	0.18	0.15	0.25	0.17	0.15	**0.20**
1885	0.58	0.23	0.17	0.17	0.13	0.18	0.16	0.26	0.17	0.15	**0.20**
Panel C. Workhouse Capacity†											
1857	1050	323	306	398	293	283	299	558	199	178	**344**
1865	-	310	284	428	303	292	271	738	239	226	**333**
1880	1152	333	298	424	297	305	294	738	259	283	**379**
1885	1343	335	300	429	297	298	291	764	289	302	**394**

Table 2.2: *Cont'd*

	Metro London (1)	South Eastern (2)	South Midland (3)	Eastern (4)	South Western (5)	West Midland (6)	North Midland (7)	North Western (8)	Yorkshire (9)	Northern (10)	All England (11)
Panel D. Workhouse Occupancy Rate†											
1857	0.964	0.467	0.406	0.393	0.449	0.463	0.447	0.617	0.510	0.568	**0.492**
1865	-	0.370	0.373	0.353	0.419	0.475	0.407	0.587	0.441	0.512	**0.432**
1880	1.603	0.463	0.467	0.360	0.459	0.661	0.498	0.943	0.604	0.609	**0.592**
1885	1.460	0.482	0.430	0.352	0.404	0.632	0.522	0.889	0.572	0.583	**0.565**
Obs.	27	95	64	54	78	87	44	36	53	38	**576**

Source: Decennial Census Reports (1851-91), *Poor Rates and Pauperism* (1857-85), *Return of Workhouse Accommodation* (1855), *Return of Poor Law Inspectors* (1868), *Local Government Directory* (1881, 86).

Notes: Panels A, B, C, and D report the average pauperism rate (i.e., paupers per population), the average fraction of paupers relieved indoors, the average workhouse capacity, and the average workhouse occupancy rate (i.e., indoor paupers per workhouse capacity) across English Poor Law unions. See Data Appendix for a complete list of census divisions and the registration counties of which they were composed.

† These data are incomplete in 1865. The Return of Poor Law Inspectors (1868) only reports the workhouse capacities of 467 of 576 English Poor Law unions. Note that 70 of these 109 "missing" Poor Law unions are in the Metropolitan London and the South Eastern census divisions.

Table 2.3: Effect of INFRAC on Pauperism Rate

	OLS	Difference-in-Differences			
	(1)	(2)	(3)	(4)	(5)
INFRAC†	-0.372**				
	(0.085)				
%INFRACCHANGE × POST		-0.264**	-0.269**	-0.265**	-0.262**
		(0.035)	(0.034)	(0.032)	(0.035)
Percent Agriculture†	0.229*	0.026	0.057	0.045	0.030
	(0.100)	(0.081)	(0.059)	(0.068)	(0.082)
Population Density†	0.170**	0.027	-0.037	0.023	0.114
	(0.064)	(0.084)	(0.069)	(0.068)	(0.083)
Agricultural Wage†	-1.040**	0.627**	0.462**	0.579**	0.606**
	(0.169)	(0.183)	(0.157)	(0.178)	(0.180)
Constant	-1.832**	-4.921**	-5.558**	-4.948**	-3.915**
	(0.706)	(0.605)	(0.466)	(0.584)	(0.514)
Cotton × Year FEs			✓		
Coal × Year FEs			✓		
Region × Year FEs				✓	
Population Change	✓				✓
Observations	547	2,188	2,188	2,188	2,188
R-Squared	0.432	0.881	0.897	0.889	0.885
%ACCEPT	17.5%	25.9%	25.4%	25.8%	26.1%

Notes: Column (1) reports the results of Equation 2.1. Column (2) reports the results of Equation 2.2. Columns (3)-(5) report the results of modified versions of Equation 2.2. Robust standard errors are reported in parentheses. INFRAC is the proportion of paupers relieved in workhouses. %INFRACCHANGE is the percent change in the proportion of paupers relieved in workhouses between 1865 and 1880. Agricultural wages are county-level averages. Regions are defined as North, South, and Midlands. The cross symbol (i.e., "†") denotes that the variable is in logs.

** Significant at the 1 percent level.
* Significant at the 5 percent level.

Table 2.4: Workhouse Constraint Bias

	All Unions	High Growth Unions	Low Growth Unions
Panel A. Via Population Growth			
1865 Estimate of α_1	-0.321**	-0.527	-0.276**
	(0.070)	(0.328)	(0.049)
Observations	547	31	516
Avg. Occupancy Rate	43.2%	60.0%	42.4%
Panel B. Via Exogenous Increase in Pauperism Rate			
1863 Estimate of α_1	-0.532**		
	(0.074)		
1865 Estimate of α_1	-0.321**		
	(0.070)		
1870 Estimate of α_1	-0.372**		
	(0.085)		
1880 Estimate of α_1	-0.350**		
	(0.054)		
1885 Estimate of α_1	-0.320**		
	(0.061)		

Notes: In Panel A, the results of Equation 2.1 are reported by population growth. Each column represents a separate regression. I define "high growth" Poor Law unions, of which there were 31, as any Poor Law union that grew by at least 20,000 persons between 1861 and 1871. I define "low growth" Poor Law unions, of which there were 516, as any Poor Law union that grew by less than 20,000 persons between 1861 and 1871. Average occupancy rates are defined as indoor paupers per workhouse capacity. In Panel B, the results of Equation 2.1 are reported by year. Each row represents a separate regression, and each row uses year-specific data.

** Significant at the 1 percent level.
* Significant at the 5 percent level.

Table 2.5: Daily Dietary Intake of Able-Bodied Male Workhouse Inmates

County	N	Cals (kcals)	Protein (g)	Carbs (g)	Fat (g)	% of Daily Calories from... Bd.	Mt.	Pot.	Ch.
Berkshire	9	1,831	109	265	55	53%	13%	5%	9%
Buckingham	7	1,886	108	275	58	50%	11%	5%	7%
Cambridge	4	1,978	122	291	59	46%	14%	9%	6%
Cornwall	1	2,549	116	378	77	37%	10%	6%	4%
Devon	1	1,953	86	325	45	42%	13%	18%	0%
Dorset	5	1,872	120	284	54	52%	10%	5%	10%
East Riding	10	1,843	106	268	56	48%	13%	4%	0%
Hampshire	23	1,851	109	265	58	49%	12%	5%	9%
Hertford	1	1,886	101	295	52	45%	16%	11%	0%
Kent	14	1,632	84	246	50	58%	2%	1%	12%
Lancashire	3	2,352	117	287	96	31%	7%	8%	1%
Lincoln	14	1,929	112	274	60	46%	14%	7%	5%
Middlesex	3	2,001	125	265	69	42%	14%	7%	7%
Norfolk	1	1,926	115	285	62	49%	1%	5%	9%
North Riding	11	2,053	121	288	67	45%	11%	5%	1%
Nottingham	8	2,427	131	310	92	37%	9%	6%	1%
Oxford	9	2,115	121	299	71	44%	10%	5%	6%
Surrey	9	1,842	100	267	56	48%	11%	6%	8%
Sussex	19	1,747	102	257	54	51%	9%	3%	10%
West Riding	12	2,277	129	304	81	42%	10%	5%	2%
Wiltshire	16	1,893	105	292	53	55%	8%	6%	9%
Total	**180**	**1,933**	**110**	**277**	**62**	**48%**	**10%**	**5%**	**7%**

Sources: Poor Law (Workhouse Dietaries) (1864), *Dietaries of the Inmates of Workhouses* (1866), *Workhouse Dietaries* (1867), *Return of Poor Law Inspectors* (1868), [14].

Notes: Column (1) reports the number of Poor Law unions in each county for which workhouse dietary data are available. Columns (2)-(5) report the average daily intake of calories, protein, carbohydrates, and fat by able-bodied male paupers across English Poor Law unions. Columns (6)-(9) report the average percent of calories that were derived from bread, meat, potatoes, and cheese, respectively, across English Poor Law unions. See Data Appendix for an example of a "daily dietary" (i.e., breakfast, dinner, and supper).

Table 2.6: Effect of INFRAC on Pauperism Rate (by Workhouse Quality)

	Ventilation (Poor = 1)	Water (Poor = 1)	Sanitation (Poor = 1)	Calories (Z-Scores)	Meat (WH/ Cty.)
	(1)	(2)	(3)	(4)	(5)
%INFRACCHANGE	**-0.232**	**-0.061**	**0.008**	**0.070**	**0.062**
× POST × WHQ	(**0.131**)	(**0.110**)	(**0.093**)	(**0.064**)	(**0.104**)
%INFRACCHANGE	-0.256**	-0.285**	-0.277**	-0.311**	-0.343**
× POST	(0.042)	(0.044)	(0.048)	(0.073)	(0.129)
POST × WHQ	0.228	0.096	-0.045	-0.025	-0.054
	(0.126)	(0.139)	(0.106)	(0.047)	(0.079)
Percent Agriculture†	-0.016	-0.033	-0.010	0.058	0.025
	(0.074)	(0.075)	(0.084)	(0.091)	(0.088)
Population Density†	-0.140	-0.146	-0.091	-0.161	-0.169
	(0.116)	(0.130)	(0.145)	(0.104)	(0.109)
Agricultural Wage†	0.721**	0.677**	0.587**	0.215	0.191
	(0.143)	(0.140)	(0.187)	(0.216)	(0.210)
Constant	-4.696**	-4.555**	-4.610**	-3.761**	-3.381**
	(0.397)	(0.397)	(0.519)	(0.524)	(0.524)
Observations	1,284	1,284	940	708	708
R-Squared	0.896	0.892	0.894	0.894	0.893

Notes: Columns (1)-(5) report the results of Equation 2.7. Each column represents a separate triple-difference regression. In columns (1)-(3), WHQ is a dummy that takes a value of 1 if the ventilation, the water supply, or the general sanitation in the workhouse, respectively, was deficient, and a value of 0 otherwise. In column (4), WHQ denotes the number of calories fed to workhouse inmates (in z-scores). In column (5), WHQ denotes the ratio of the amount of meat fed to workhouse inmates to the estimated amount of meat consumed by "poor labourers" in the county in which the workhouse was located. Robust standard errors are reported in parentheses. The cross symbol (i.e., "†") denotes that the variable is in logs.

** Significant at the 1 percent level.

* Significant at the 5 percent level.

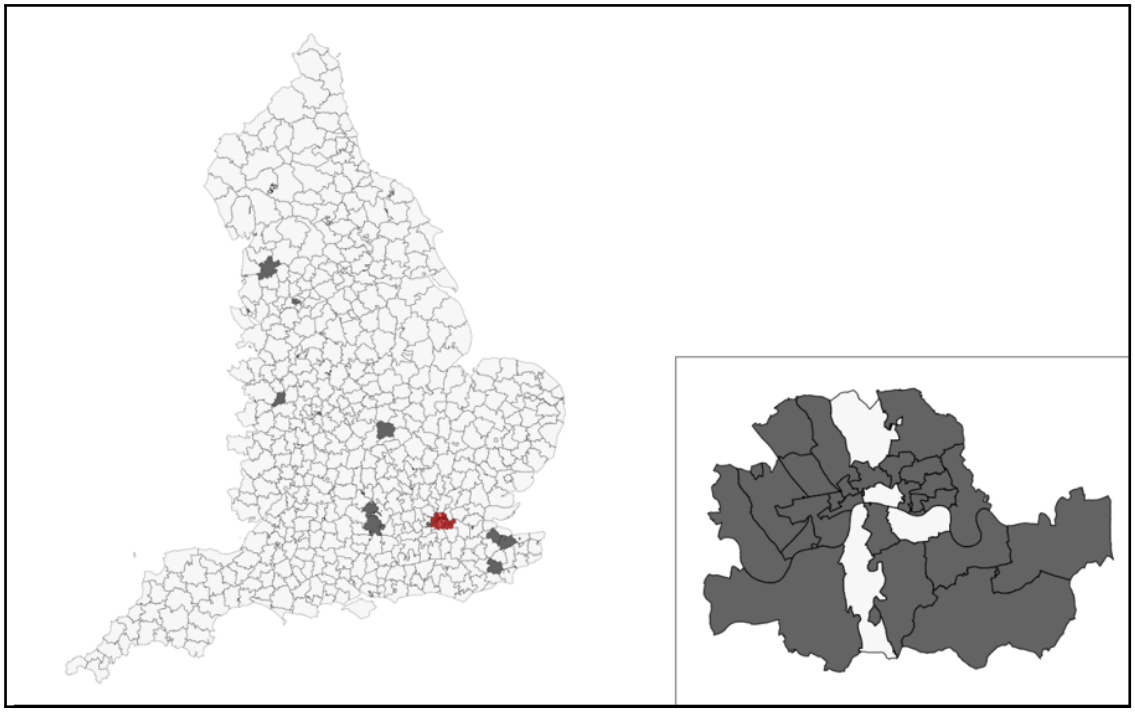
Table 2.7: Effect of the Union Chargeability Act on Crusade Adoption

	UCA = Standard Deviation of Parish Poor Rates (1)	UCA = Average Minus Minimum Poor Rate (2)
UCA	0.004	0.003
	(0.002)	(0.002)
Percent Agriculture†	0.012	0.011
	(0.013)	(0.013)
Population Density†	0.024**	0.024**
	(0.009)	(0.009)
Agricultural Wage†	0.120**	0.119**
	(0.032)	(0.032)
Population Change†	-0.002	-0.001
	(0.003)	(0.003)
Cotton Dummy	0.037*	0.416*
	(0.017)	(0.129)
Coal Dummy	-0.022	-0.021
	(0.011)	(0.011)
Constant	-0.288**	-0.278**
	(0.095)	(0.094)
Observations	547	547
R-Squared	0.129	0.135

Notes: Columns (1) and (2) report the results of Equation 2.8. Each column represents a separate OLS regression. In column (1), UCA measures the standard deviation of parish poor rates within Poor Law unions in 1856. In column (2), UCA measures the difference between the average poor rate and the poor rate in the least-taxed parish within Poor Law unions in 1856. Robust standard errors are reported in parentheses. The cross symbol (i.e., "†") denotes that the variable is in logs.

** Significant at the 1 percent level.
* Significant at the 5 percent level.

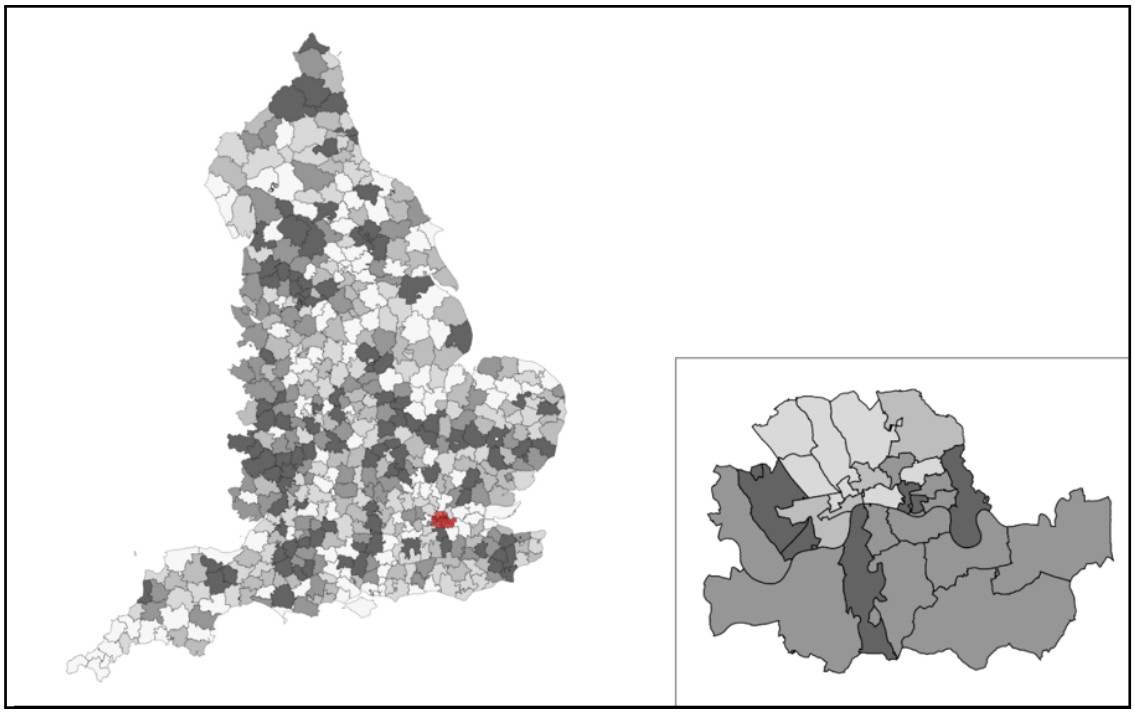
Figure 2.1: Williams' (1981) "Crusade Unions"



Sources: *Great Britain Historical GIS Projec*t (2011), [114].

Notes: This figure plots the 41 English Poor Law unions that Williams (1981) defines as Crusade unions (i.e., "unions that restricted out-relief," using the criterion that they relieved less than 30 percent of all paupers outdoors on January 1st, 1893). The inset depicts and magnifies the Metropolitan London census division (also pictured in red in the main panel).

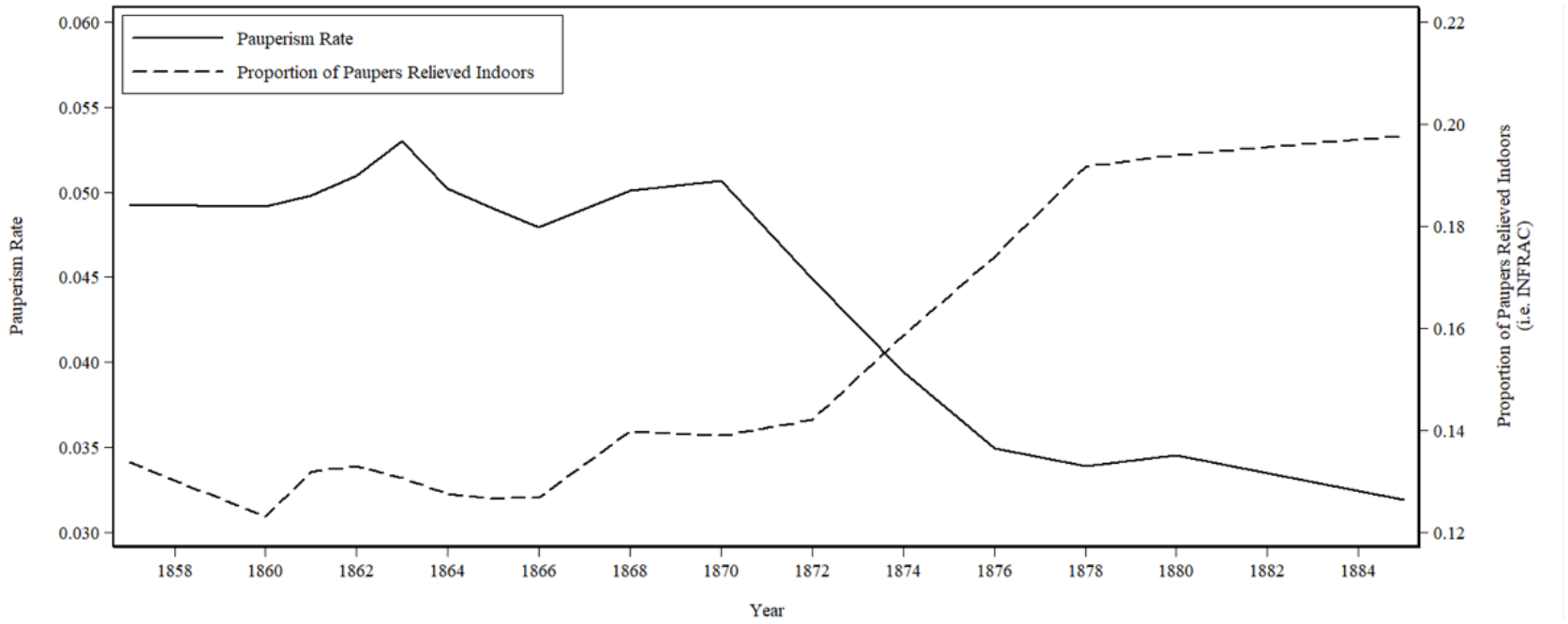
Figure 2.2: Percent Change in INFRAC (1865-80)



Sources: *Poor Rates and Pauperism* (1857-85), *Great Britain Historical GIS Project* (2011).

Notes: This figure plots quintiles of the percent change in the fraction of paupers relieved indoors (i.e., indoor paupers per total paupers) between 1865 and 1880 across English Poor Law unions. Note that 68 Poor Law unions in the first quintile had a *negative* change in INFRAC (i.e., they relieved a smaller fraction of paupers indoors in 1880 than they did in 1865). The inset depicts and magnifies the Metropolitan London census division (also pictured in red in the main panel).

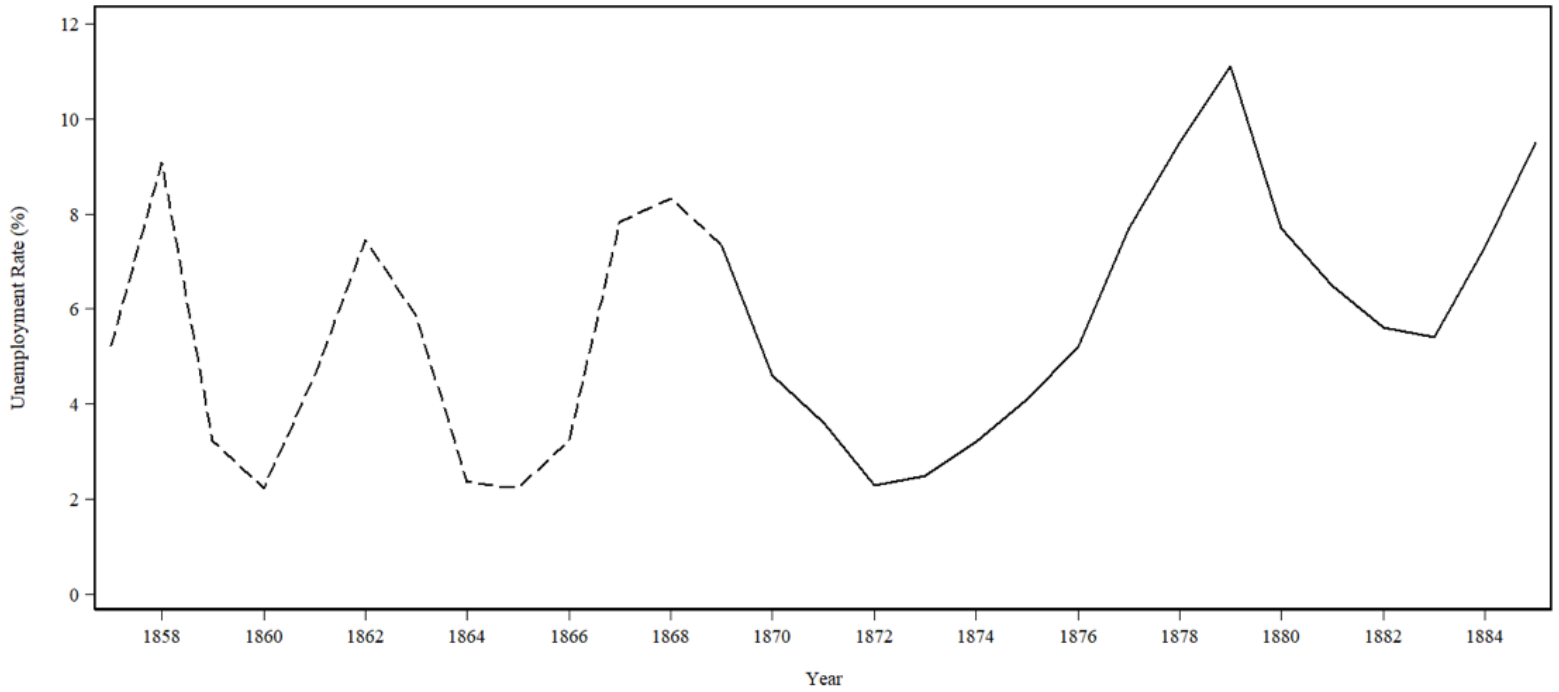
Figure 2.3: Pauperism Rate vs. Fraction of Paupers Relieved Indoors



Sources: *Decennial Census Reports* (1851-91), *Poor Rates and Pauperism* (1857-85).

Notes: The solid line represents the average pauperism rate (i.e., paupers per population) across English Poor Law unions. The dashed line represents the average fraction of paupers relieved indoors (i.e., indoor paupers per total paupers) across English Poor Law unions. Years included are 1857, 1860-66, 1868, 1870, 1872, 1874. 1876, 1878, 1880, 1885.

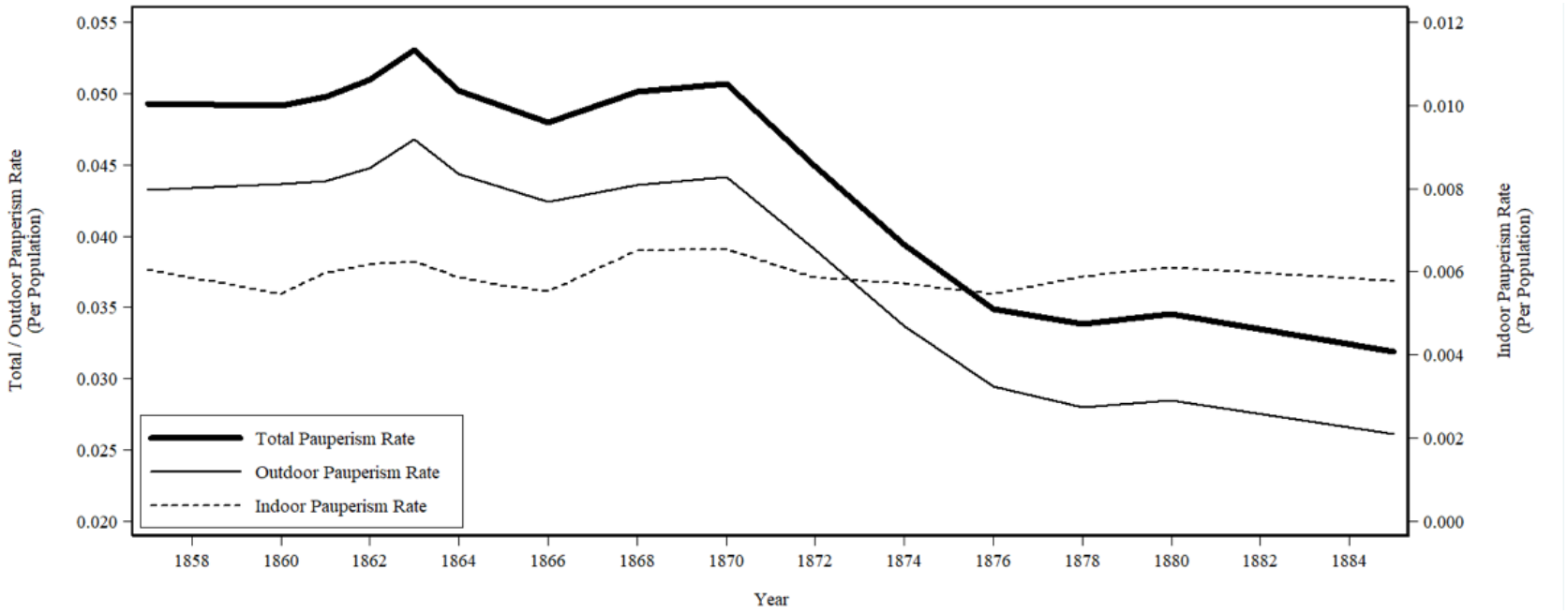
Figure 2.4: Pauperism Rate vs. Fraction of Paupers Relieved Indoors



Sources: [25, 39].

Notes: Pre-1870 estimates are more speculative, and are based on Feinstein, *National Income, Expenditure and Output of the United Kingdom, 1855-1965* (1972). As such, they are dashed.

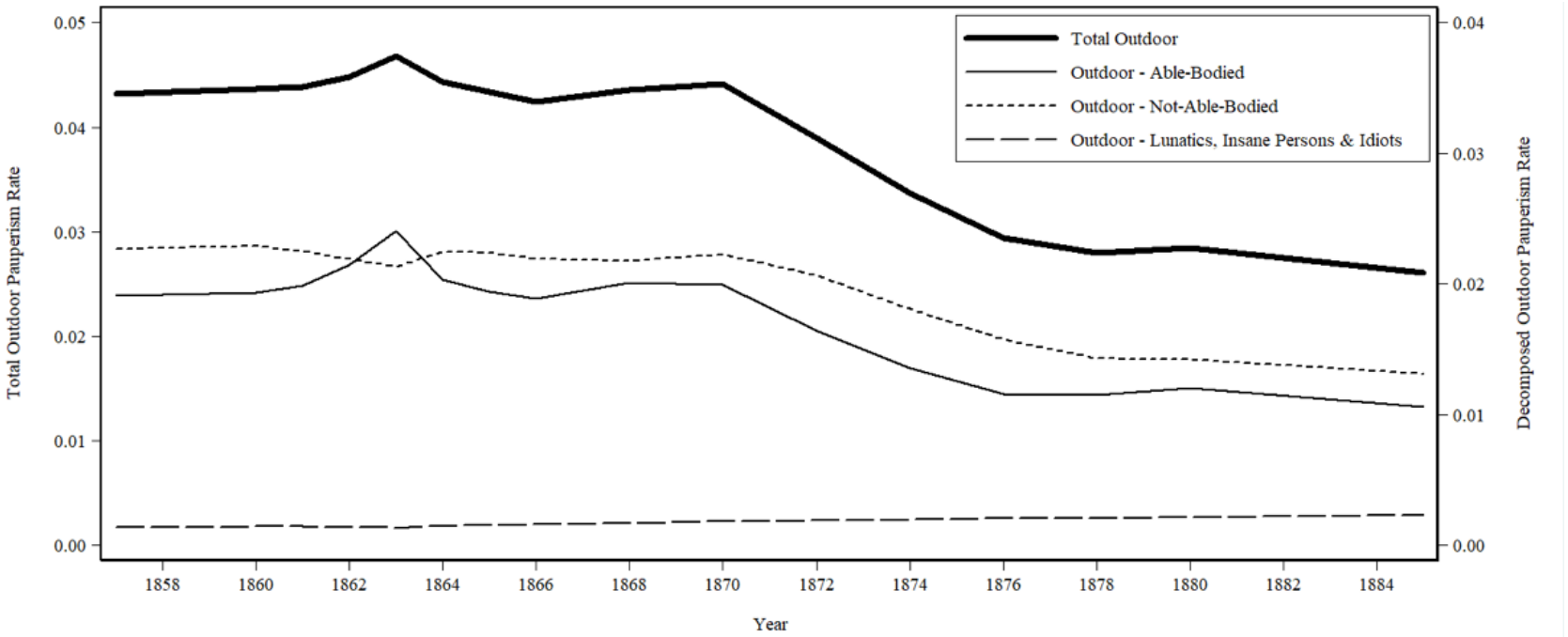
Figure 2.5: Decomposition of Pauperism Rate



Sources: *Decennial Census Reports* (1851-91), *Poor Rates and Pauperism* (1857-85).

Notes: The thick solid line represents the average *total* pauperism rate (i.e., paupers per population) across English Poor Law unions. The thin solid line represents the average *outdoor* pauperism rate (i.e., outdoor paupers per population) across English Poor Law unions. The dashed line represents the average *indoor* pauperism rate (i.e., indoor paupers per population) across English Poor Law unions. Years included are 1857, 1860-66, 1868, 1870, 1872, 1874. 1876, 1878, 1880, 1885.

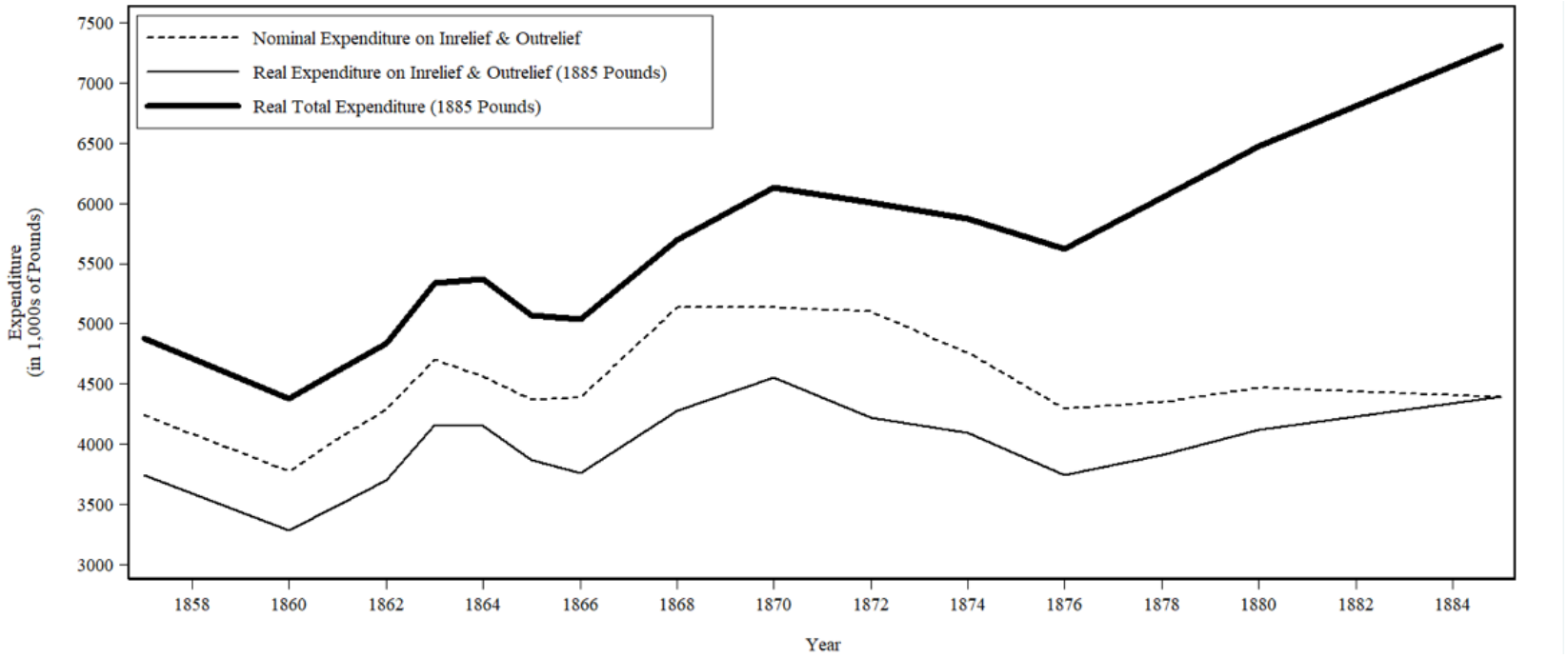
Figure 2.6: Decomposition of Outdoor Pauperism Rate



Sources: *Decennial Census Reports* (1851-91), *Poor Rates and Pauperism* (1857-85).

Notes: The thick solid line represents the average outdoor pauperism rate (i.e., outdoor paupers per population) across English Poor Law unions. The thin solid line represents the average rate of *able-bodied* outdoor pauperism (i.e., able-bodied outdoor paupers per population) across English Poor Law unions. The short-dashed line represents the average rate of *non-able-bodied* outdoor pauperism (i.e., non-able bodied outdoor paupers per population) across English Poor Law unions. The long-dashed line represents the average rate of *"lunatic"* outdoor pauperism (i.e., "lunatic" outdoor paupers per population) across English Poor Law unions. Years included are 1857, 1860-66, 1868, 1870, 1872, 1874. 1876, 1878, 1880, 1885.

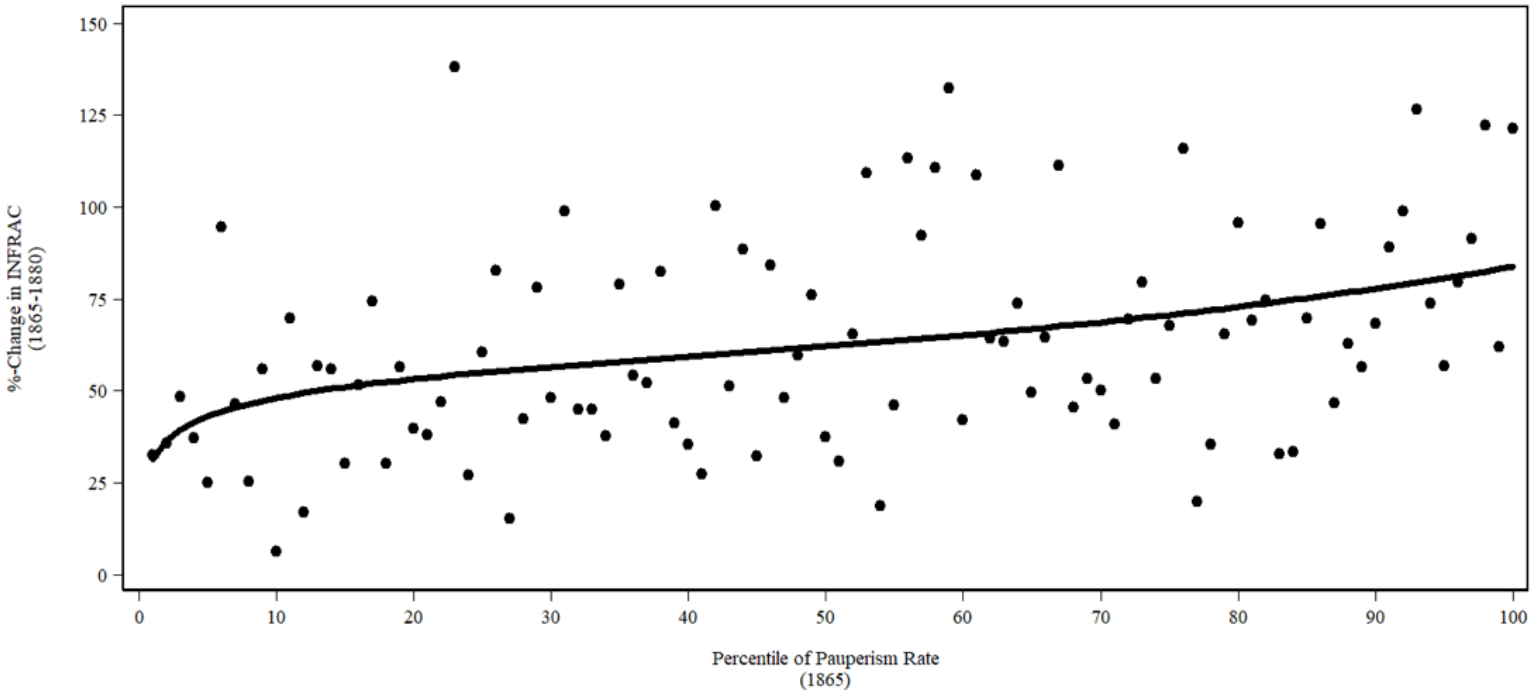
Figure 2.7: Poor Law Expenditures



Sources: [114, 30]

Notes: The dashed line represents *nominal* Poor Law expenditures on indoor and outdoor relief. Indoor relief expenditures are defined as "all expenses of maintenance, treatment, and relief of paupers in workhouses," excluding "the cost of building and repairs, furniture, and the salaries, rations, and superannuation of officers and servants." Outdoor relief expenditures are defined as "the cost of relief, in money and kind, given outside poor law establishments" (i.e., outside workhouses). The thin solid line represents *real* Poor Law expenditures on indoor and outdoor relief (in 1885 pounds). The thick solid line represents *total real* Poor Law expenditures, including workhouse construction costs, workhouse repair costs, debt repayments (principal and interest) associated with workhouse construction and repair, and the salaries and rations of workhouse officers.

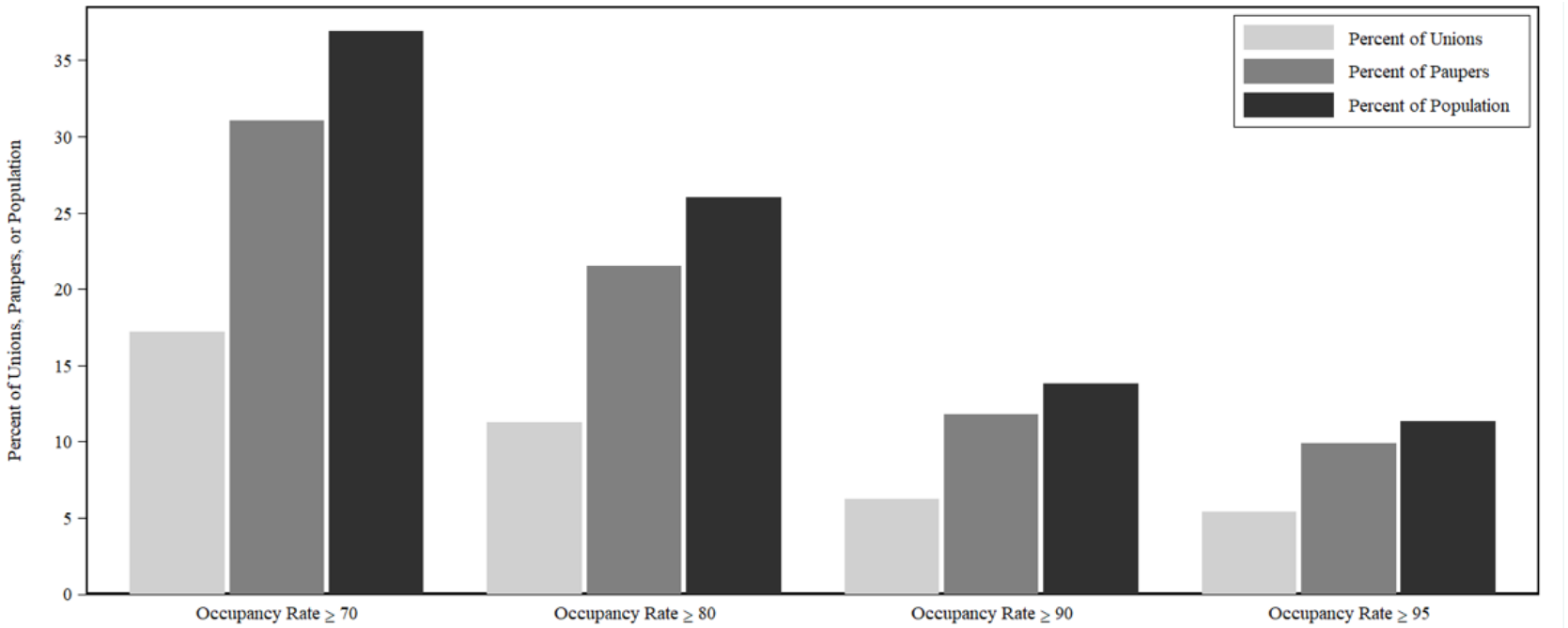
Figure 2.8: Pauperism Rate (1865) vs. Percent Change in INFRAC (1865-80)



Sources: *Decennial Census Reports* (1861-71), *Poor Rates and Pauperism* (1865, 80).

Notes: Each dot represents the average percent change in the fraction of paupers relieved indoors between 1865 and 1880 among all English Poor Law unions in a particular percentile of pauperism rate (i.e., paupers per population). Also pictured is a second-degree polynomial of best fit.

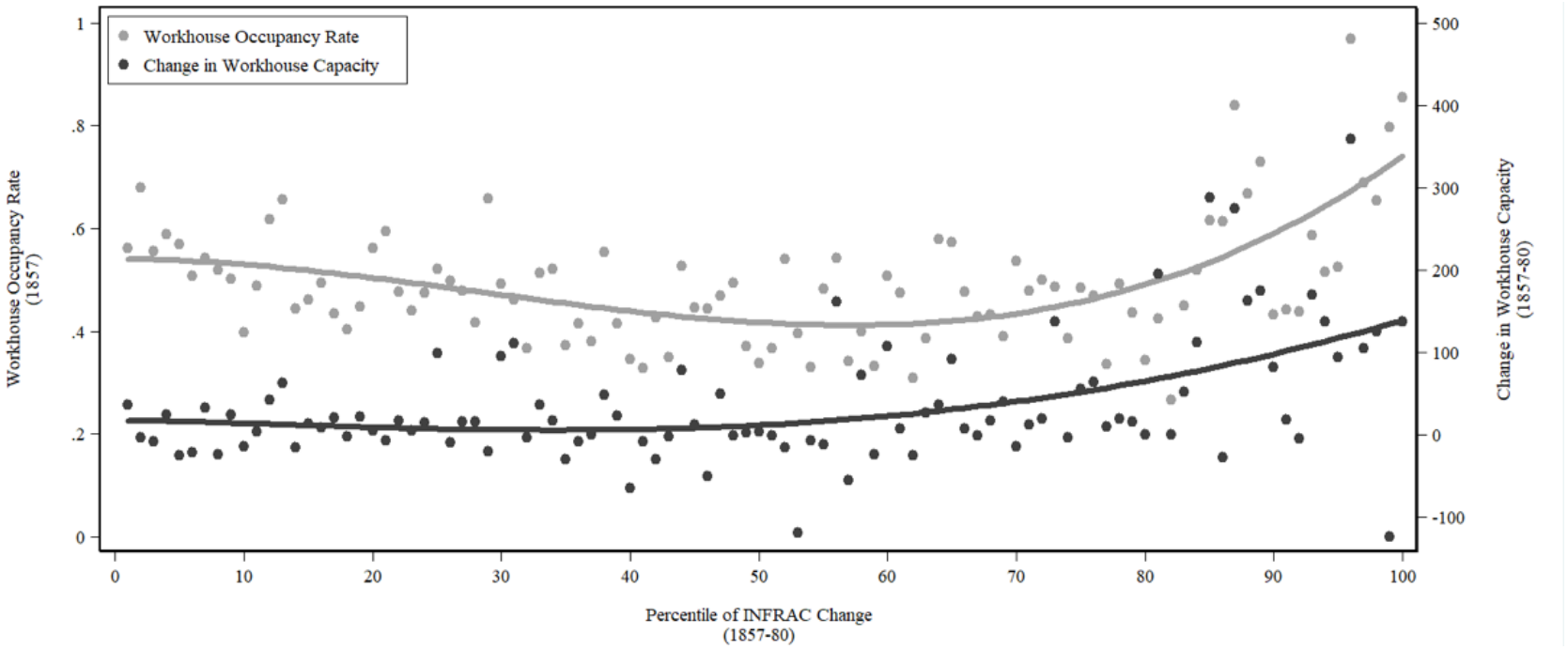
Figure 2.9: Workhouse Occupancy Rate (1857)



Sources: *Return of Workhouse Accommodation* (1855), *Poor Rates and Pauperism* (1857).

Notes: The light-grey bars plot the percent of English Poor Law unions in which the workhouse occupancy rate (i.e., indoor paupers per workhouse capacity) exceeded 70, 80, 90, and 95 percent, respectively. The medium-grey bars plot the percent of all English paupers that lived in these unions. The dark-grey bars plot the percent of all English persons that lived in these unions.

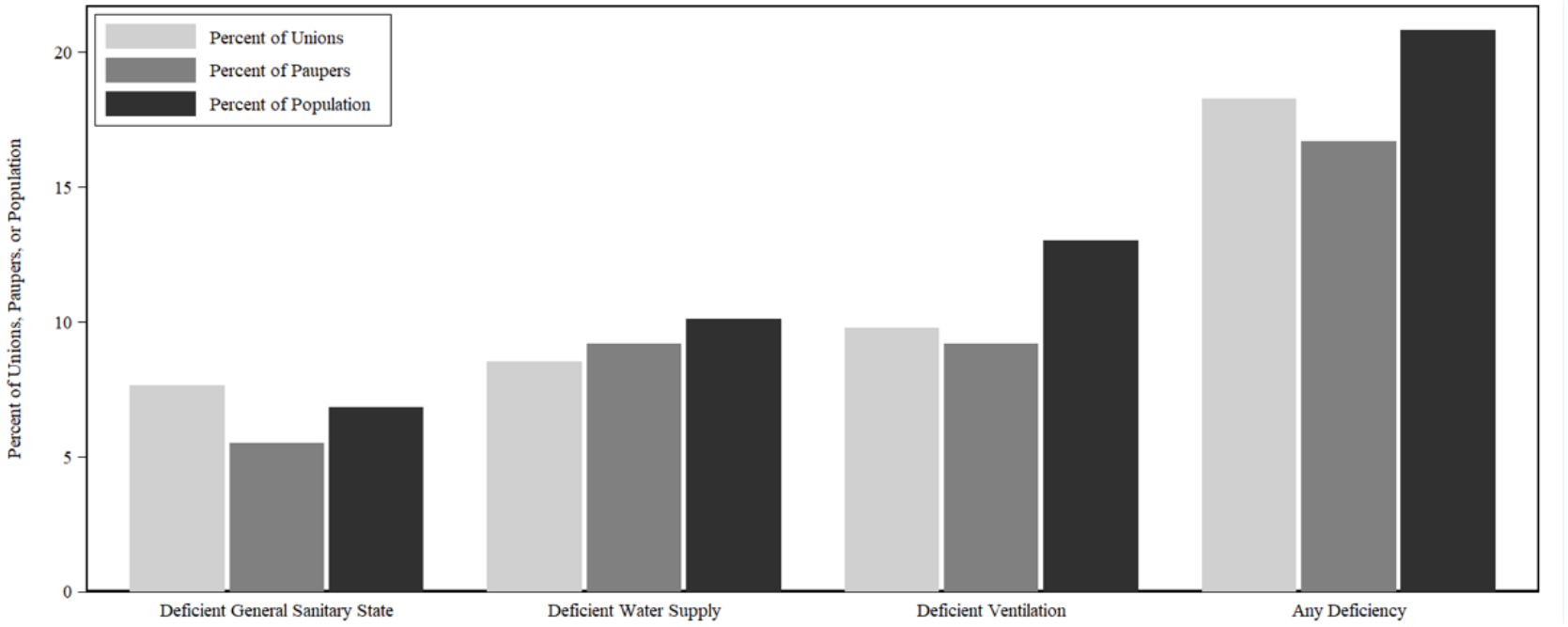
Figure 2.10: Workhouse Occupancy & Workhouse Capacity by Changes in INFRAC



Sources: *Return of Workhouse Accommodation* (1855), *Poor Rates and Pauperism* (1857, 80), *Local Government Directory* (1881).

Notes: Each grey dot represents the average workhouse occupancy rate in 1857 among all English Poor Law unions in a particular percentile-bin of "INFRAC Change" (i.e., the percentage-point change in the fraction of paupers relieved indoors between 1857 and 1880). Each black dot represents the average change in workhouse capacity between 1857 and 1880 among all English Poor Law unions in a particular percentile-bin of "INFRAC Change." Also pictured are second-degree polynomials of best fit.

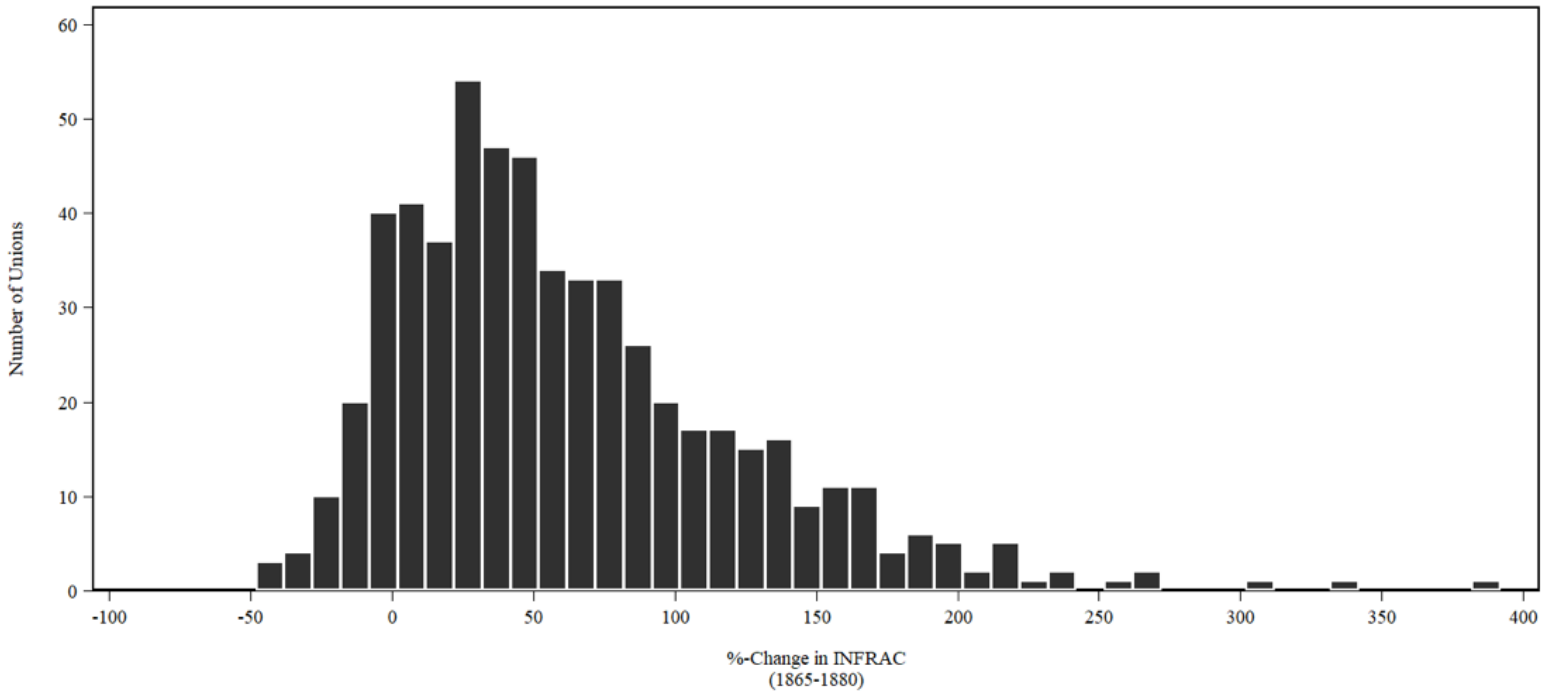
Figure 2.11: Sanitary Condition of Workhouses (1867)



Sources: *Return of Poor Law Inspectors* (1868).

Notes: The light-grey bars plot the percent of English Poor Law unions in which the workhouse had a general sanitary deficiency, a water supply deficiency, a ventilation deficiency, or any of these deficiencies, respectively. The medium-grey bars plot the percent of all English paupers that lived in these unions. The dark-grey bars plot the percent of all English persons that lived in these unions. Note that these data are incomplete. The *Return of Poor Law Inspectors* (1868) yields a sample of 235 Poor Law unions (roughly one-third of all English Poor Law unions).

Figure 2.12: Percent Change in INFRAC (1865-80)



Sources: *Poor Rates and Pauperism* (1865, 80).

Notes: This histogram plots the percent change in the fraction of paupers relieved indoors (i.e., indoor paupers per total paupers) between 1865 and 1880 across English Poor Law unions. Note that 68 Poor Law unions had a *negative* INFRAC value (i.e., 68 Poor Law unions relieved a smaller fraction of paupers indoors in 1880 than they did in 1865).

Figure 2.13: Pauperism Rate by Quartile of Percent Changes in INFRAC

Sources: *Decennial Census Reports* (1851-91), *Poor Rates and Pauperism* (1857-85).

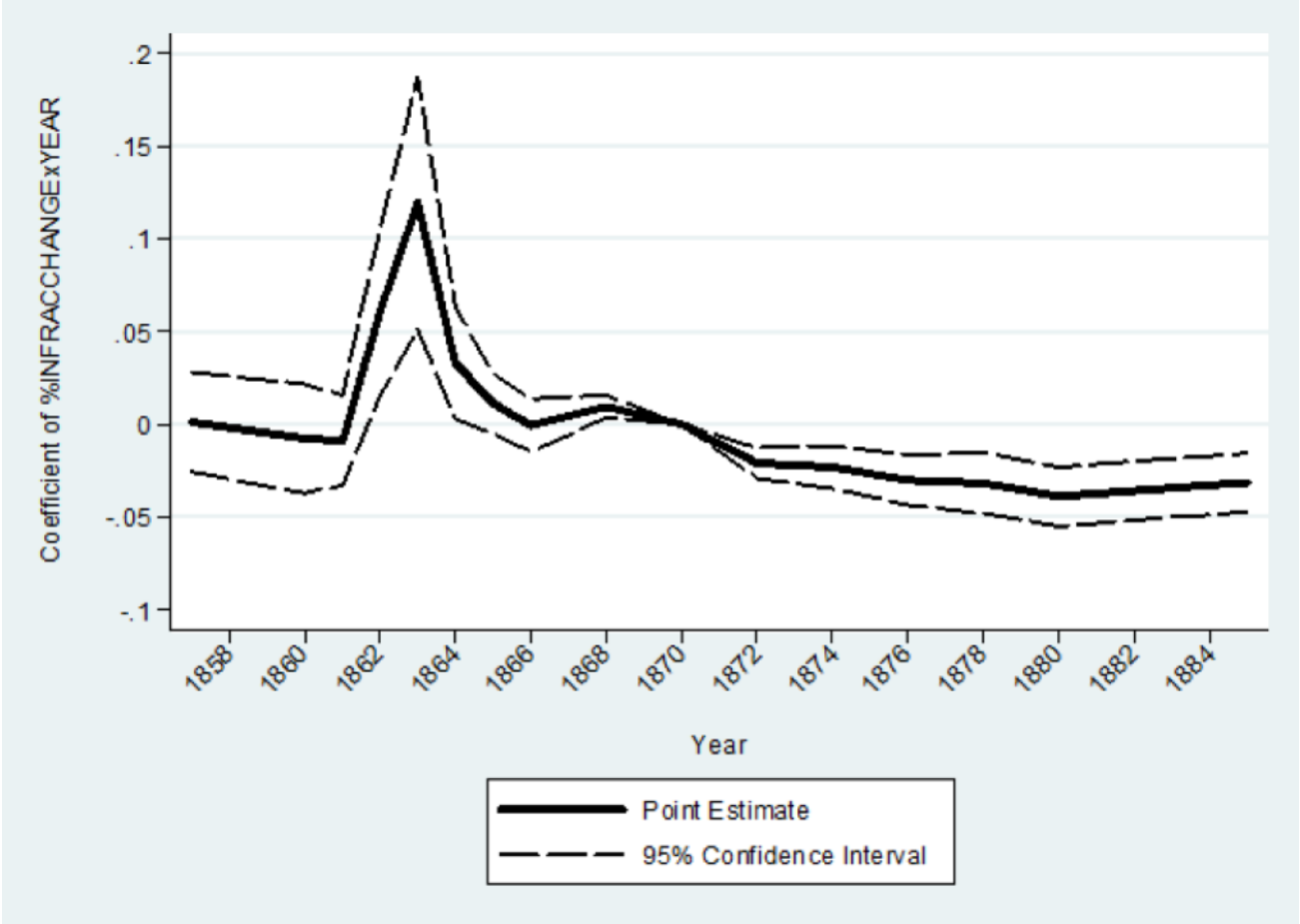
Notes: The dashed line plots the average pauperism rate of English Poor Law unions in the first quartile of percent changes in the fraction of paupers relieved indoors (i.e., indoor paupers per total paupers) between 1865 and 1880. The solid line plots the average pauperism rate of English Poor Law unions in the fourth quartile of percent changes in the fraction of paupers relieved indoors between 1865 and 1880. Put differently, the dashed line plots "control" unions and the solid line plots "treated" unions (i.e., "Crusade unions").

Figure 2.14: Pauperism Rate by Quartile of Percent Changes in INFRAC (No Chesh/Lancs)

Sources: *Decennial Census Reports* (1851-91), *Poor Rates and Pauperism* (1857-85).

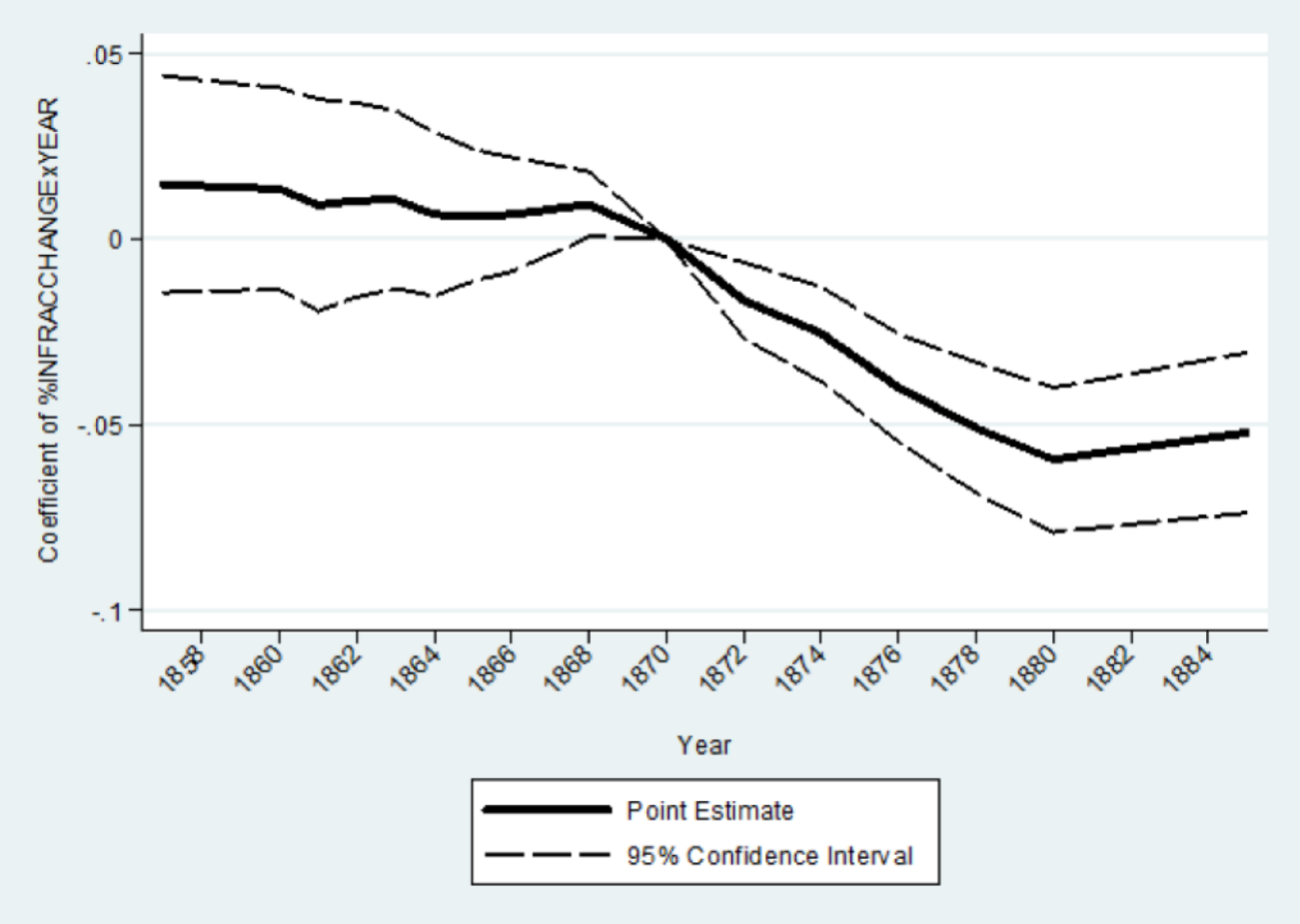
Notes: The dashed line plots the average pauperism rate of English Poor Law unions in the first quartile of percent changes in the fraction of paupers relieved indoors (i.e., indoor paupers per total paupers) between 1865 and 1880. The solid line plots the average pauperism rate of English Poor Law unions in the fourth quartile of percent changes in the fraction of paupers relieved indoors between 1865 and 1880. Put differently, the dashed line plots "control" unions and the solid line plots "treated" unions (i.e., "Crusade unions"). The counties of Lancashire and Cheshire are excluded. These counties contained 37 Poor Law unions.

Figure 2.15: Event Study



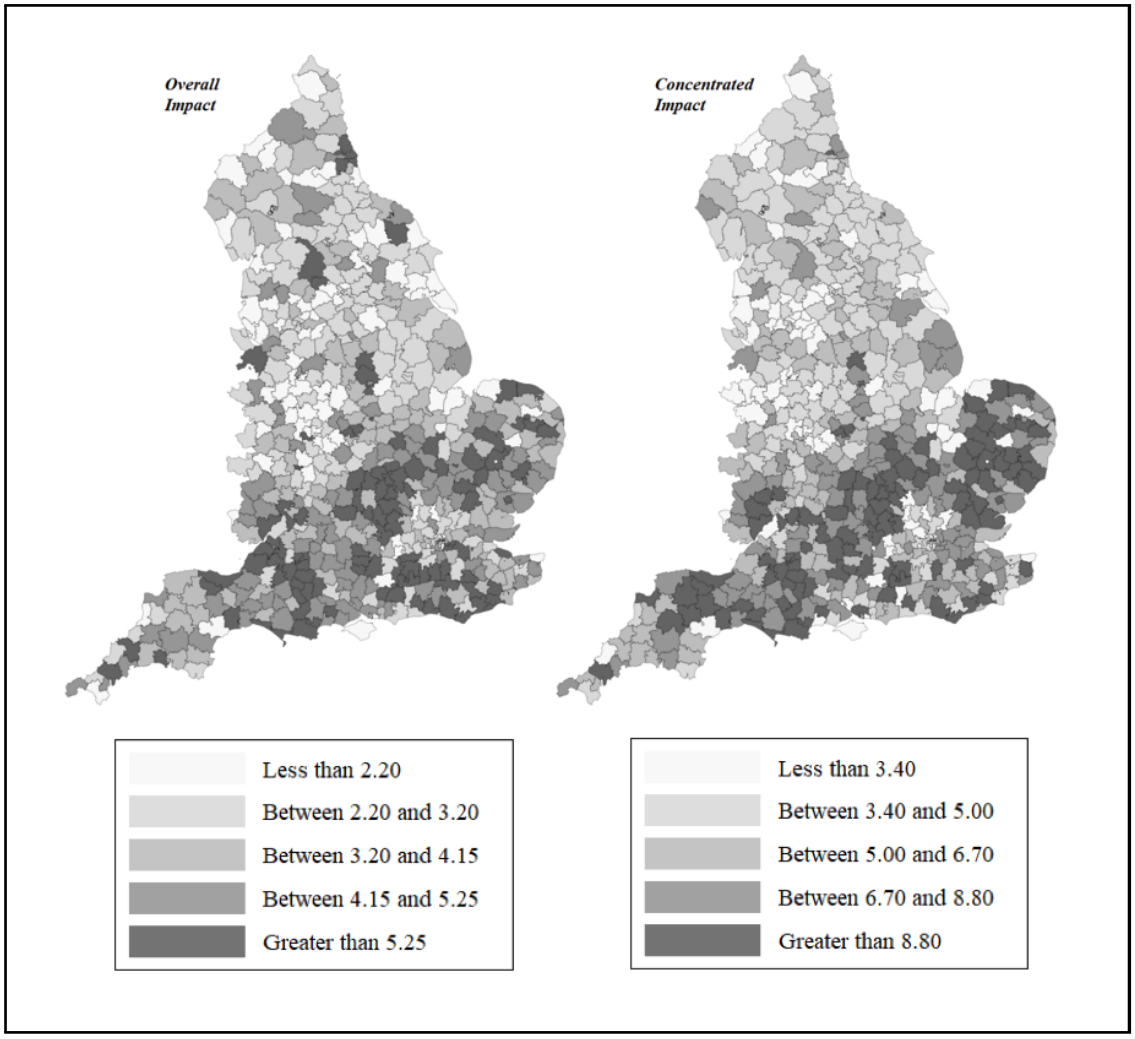
Notes: The solid line plots the point estimates of π_τ from Equation 2.3. The dashed lines plot 95 percent confidence intervals. Years included are 1857, 1860-66, 1868, 1870. 1872, 1878, 1880, and 1885.

Figure 2.16: Event Study (No Chesh/Lancs)



Notes: The solid line plots the point estimates of π_τ from Equation 2.3. The dashed lines plot 95 percent confidence intervals. Years included are 1857, 1860-66, 1868, 1870. 1872, 1878, 1880, and 1885. The 37 Poor Law unions in Lancashire and Cheshire are excluded.

Figure 2.17: Impact of the Union Chargeability Act of 1865



Sources: *Return of the Rate in the Pound* (1861), *Great Britain Historical GIS Project* (2011).

Notes: The figure plots two measures, by quintle, of the impact of the Union Chargeability Act of 1865. The leftmost panel plots the *overall* impact of the Act, as measured by the standard deviation of parish poor rates within each English Poor Law union in 1856. The rightmost figure plots the *concentrated* impact of the Act on rich parishes, as measured by the difference between the minimum poor rate levied among parishes within each English Poor Law union in 1856 and the common poor rate that would have prevailed among parishes within each English Poor Law union in 1856 under "union chargeability." Darker shading represents a greater impact.

CHAPTER 3

WEALTH AND WEALTH REDISTRIBUTION: EVIDENCE FROM ENGLAND, 1881

3.1 Introduction

"Despite all of the achievements of the century passed, poverty continues to exist, with its normal concomitants. Class antagonism based on differences of wealth shows little sign of lessening, [and] greed [has] well-nigh dominated society" [100, p. 138]. This was written in the Quarterly Journal of Economics in 1903. It suggests that wealth generated greed (or vice versa), and that, ipso facto, very wealthy people or places were uniquely unamenable to wealth redistribution. Were classes, in fact, antagonistic? Did wealth itself affect attitudes toward the redistribution of wealth from one class (e.g., taxpayers) to another (e.g., welfare recipients)? Statistically speaking, these are complicated questions. Wealth is mechanically correlated with poverty. Wealth is mechanically correlated with the capacity to redistribute. And charity almost certainly confounds the relationship between wealth and *public* wealth redistribution. Charitable contributions derived overwhelmingly, if not exclusively, from the very wealthy, and, for this reason, the very wealthy might have regarded *public* wealth redistribution as unnecessary or even counterproductive. In this essay, I isolate plausibly exogenous variation in wealth in England in 1881 in order to estimate the effect of wealth on public wealth redistribution (i.e., on welfare generosity).

Between 1601 and 1948, the English welfare system was the Poor Law. It was administered locally by approximately 600 Poor Law unions, each of which was, for all intents and purposes, autonomous, and in each of which a board

of guardians determined the generosity with which welfare was apportioned to welfare applicants. Some Poor Law unions were generous. Others were not. Poor Law unions were themselves agglomerations of parishes, smaller geographical units of which there were approximately 14,000. Guardians were allocated to each parish in each Poor Law union. More guardians were allocated to more populous parishes and less guardians were allocated to less populous parishes, but every parish, however populous, was guaranteed one guardian, therefore the least populous parishes possessed more guardians per capita than the average parish. It happened, hardly by accident, that the least populous parishes were disproportionately wealthy. In this way, wealth was systematically over-represented by boards of guardians. But the *degree* to which wealth was over-represented by boards of guardians was, I demonstrate, arbitrary. I use this variation as an instrument for wealth.

The United States Senate provides a useful analogy. The Senate is noteworthy for its "unrepresentativeness" [89, 62, 78, 115].[1] A voter in North Dakota, for example, is over-represented by the Senate relative to a voter in California. Since every state is entitled to two senators, less populous states possess more senators per capita than more populous states. Moreover, since less populous states tend to be poorer, on average, than more populous states, one might say that the Senate under-represents income. In 2018, per capita income in the United States was $53,712, yet average per capita income across states (weighting states equally, and disregarding the District of Columbia) was $51,963 [87]. The Senate is a macrocosm of English boards of guardians. The United States is an agglomeration of states. Poor Law unions were agglomerations of parishes. But the

[1]Note that the Senate was designed as a body that would represent states *directly*, and citizens only *indirectly*. It was "a compromise between the opposite pretentions of the large and the small states." See [75].

Senate is only one-half of one of three branches of government, whereas boards of guardians were governments unto themselves. And there is only one United States, whereas there were hundreds of Poor Law unions, therefore there is ample variation in both wealth and welfare generosity with which to estimate the effect of the former on the latter.

Much has been written about the relationship between wealth *inequality* (or the "prospect of upward mobility") and welfare generosity. Benabou & Ok (2001) and Meltzer & Richard (1981), for example, suggest that greater inequality should or will yield greater wealth redistribution [18, 82]. But little, if anything, has been written about the relationship between wealth *itself* and welfare generosity. Victorian England provides a fecund empirical setting in which to study this question. First, the Poor Law, as a redistributive program, did not compete or interact with other redistributive programs (e.g., Medicaid, EITC, SNAP, etc.). It was the *only* redistributive program in England in 1881. Second, the Poor Law was administered hyper-locally. It was neither a national- nor regional- nor county-level program. The average Poor Law union had only 41,995 persons in 1881. If one were to divide the United States in 2018 into 41,995-person units, there would be 7,834 such units, more than twice as many such units as there are counties in the United States in 2018. The average Poor Law union was only 86 square miles in 1881. If one were to divide the United States in 2018 into 86-square-mile units, there would be 44,148 such units, more than fourteen-times as many such units as there are counties in the United States in 2018. Third, the Poor Law provides straightforward quantitative measures of welfare generosity. I use two such measures: (*i*) the proportion of welfare recipients relieved in workhouses and (*ii*) average relief (in pounds) granted to welfare recipients not relieved in workhouses.

I make three main contributions. First, I introduce a new dataset of 13,869 English parishes and 576 English Poor Law unions assembled, among other sources, from Census Reports and reports of Parliament. I match each parish to the Poor Law union to which it belonged. *Parish*-level data include population, rateable value (i.e., property wealth), and number of Poor Law guardians. *Union*-level data include population, population density, coal and cotton-textile production, distance from urban and "urbanizing" centers, percent of adults working in agriculture, percent of population that lived in a municipal borough, percent of Parliamentary representatives that belonged to a conservative political party, percent of population that was non-Anglican Protestant, percent of population that attended church services, fraction of welfare recipients relieved in workhouses, and Poor Law expenditure. Second, I use an instrumental variables model to demonstrate that wealth caused neither an increase nor a decrease in welfare generosity. Relatively wealthy Poor Law unions were no more or less likely to relieve paupers in workhouses or to issue larger or smaller payments to paupers not relieved in workhouses than relatively poor Poor Law unions. My instrument isolates unique, plausibly exogenous variation in wealth, and hence enables me to identify this causal effect (or lack thereof). I conclude that classes were not, in fact, as antagonistic as the aforementioned quote in the QJE suggested. Third, I construct a new, parish-level measure of wealth skewness using per capita parish wealth and the proportion of parish population that was eligible to vote in Poor Law guardian elections between 1873 and 1875.

The remainder of this essay is organized as follows. In Section 3.2, I provide a brief outline of the English Poor Law, of the election of boards of guardians, and of the allocation of guardians across parishes within Poor Law unions. In

Section 3.3, I introduce my dataset, discuss the assumptions associated with my instrument, estimate an instrumental variables model, and interpret my results. In Section 3.4, I introduce the aforementioned measure of wealth skewness and the way in which it was constructed. In Section 3.5, I conclude.

3.2 Institutional Background

3.2.1 The English Poor Law

Welfare in England took two forms: (*i*) *outdoor relief* and (*ii*) *indoor relief*. Outdoor relief was cash or in-kind payments of food, fuel, or clothing. Indoor relief was room and board in a workhouse. Workhouses were deliberately made "as like prisons as possible"—they were often insufficiently lit, ventilated, or sanitized; inmate classes (e.g., men, women, and children) were separated from one another; and diets were meager and monotonous [107, p. 267]. Relief applicants to whom indoor relief was offered were wont to reject the offer out of hand and, for this reason, indoor relief was the preferred form of welfare among reformers seeking to reduce the size of welfare rolls. These reformers grew in number alongside welfare rolls (and welfare expenditures) in the late-eighteenth and early-nineteenth centuries.[2]

In 1834, Parliament passed the Poor Law Amendment Act. The Act agglomerated parishes (the administrative unit of the Poor Law until 1834) into Poor Law unions. Since workhouses required relatively large up-front capital out-

[2]Welfare expenditure as a percent of GDP more than doubled in England and Wales between 1750 and 1820. See [66, p. 46].

lays, they also required a relatively large tax base and, therefore, a relatively large population.[3] In most cases, parishes were insufficiently populous to afford these outlays. Combined with adjacent parishes, however, workhouse costs could be shared. By 1881, 172,849 welfare recipients—22.4 percent of all welfare recipients and 0.7 percent of all people—were relieved in workhouses. This increase in indoor relief would have been impossible without the "construction programme" that occurred, and the "construction programme" that occurred would have been impossible without the Poor Law union [114, pp. 87-88]. I discuss the parish and the Poor Law union below.

Parishes. The English parish was ecclesiastical in origin, but accrued, over centuries, a great many civil functions, including the administration of the Poor Law (until 1834). The so-called "ancient" parish was replaced in the nineteenth century by the civil parish and the ecclesiastical parish.[4] For the purposes of this essay, "parish" refers to civil parish, of which there were 13,869 in 1881. Figure 3.1 maps them. With some exceptions, parishes were very small—1,691 had a population of less than 100, 8,080 had a population of less than 500, and 10,510 had a population of less than 1,000. Figure 3.2 plots the distribution of parish population.

Poor Law Unions. The first Poor Law union to be formed was Abingdon in Berkshire. By 1881, there were 591.[5] Figure 3.3 maps them. Most Poor Law

[3]The Poor Law was financed locally.

[4]Civil and ecclesiastical parishes were rarely coterminous. By 1901, "the total number of [civil] parishes in England and Wales (excluding London) was 14,900, while the number of ecclesiastical parishes was 14,080. In only 5,175 cases did the civil and ecclesiastical boundaries coincide." See [116, pp. 1-9].

[5]Note that the dataset that I describe in Section 3.3 includes only 576 of these 591 Poor Law unions. It excludes the Poor Law unions for which there were irreconcilable boundary changes between 1851 and 1881. In 1869, all so-called Gilbert's Unions were abolished, and the parishes of which they consisted were re-allocated to adjacent Poor Law unions. Many Gilbert's Unions were geographically disjunct, and it is, therefore, difficult to reconcile the pre- and post-1869 boundaries of the Poor Law unions that were affected by this re-allocation. Since I include some

unions consisted of between 10 and 40 parishes, but 29 consisted of a single populous parish, and 29 others consisted of more than 50 unpopulous parishes. Figure 3.4 plots the distribution of parishes per union. Each Poor Law union was required to build and maintain a workhouse and elect a board of guardians responsible for "ordering, giving, and directing all relief to the poor."[6] Guardian elections were held by parishes. Each parish was entitled to a certain, predetermined number of guardians on its Poor Law union's board.

3.2.2 Parish Representation

Parish representation depended on (*i*) the allocation of parishes to Poor Law unions and (*ii*) the allocation of guardians to parishes. The more *parishes* allocated to a particular Poor Law union, the less (relative) representation any one parish in that Poor Law union would have on that Poor Law union's board of guardians. The more *guardians* allocated to a particular parish, the more (relative) representation that parish would have on its Poor Law union's board of guardians. The Poor Law Amendment Act delegated the duty of parish and guardian allocation to the Poor Law Commission, which, in turn, re-delegated the duty to its Assistant Commissioners.[7]

Allocation of Parishes to Unions. Section 26 of the Poor Law Amendment Act

pre-1869 variables in my dataset, I drop the 15 Poor Law unions that were affected by such boundary changes.

[6]Section 54 of the Poor Law Amendment Act of 1834 stripped parish "overseers of the poor" of the authority "to grant relief, except in cases of sudden and urgent necessity, without an order of the board." See [73, p. 158].

[7]The Poor Law Commission was a three-man body tasked with "carrying [the] Act into execution." It was "empowered...to appoint such persons as they may think fit to be Assistant Commissioners." It had appointed nine such Assistant Commissioners by December of 1834 and fifteen by August of 1835. Among them were "one or two ex-army officers, several barristers, one or two solicitors, and two or three 'private gentlemen.'" See [73, p. 162] and [67, p. 3].

stipulated that the Poor Law Commission "shall...declare so many parishes as they may think fit to be united for the administration of the laws for the relief of the poor, and such parishes shall be deemed a union for such purpose." Parliament "left it to the Commissioners' unfettered discretion to determine what parishes should be federated," and "whatever the principles of the Commissioners may have been, their practice was probably considerably modified by the pressure of local interests" [28, p. 63]. Most often, Poor Law unions took the form of a circle, with "a market town as a centre, and comprehending those surrounding parishes whose inhabitants [were] accustomed to resort to the same market" [3]. There was no limit on the geographical size of Poor Law unions, but "ten miles [from the far end to the near] was considered [convenient], and that distance was rarely exceeded" [85, pp. 292-293]. In this way, inconvenience "was brought to a minimum" [67, p. 44].

Allocation of Guardians to Parishes. Section 38 of the Poor Law Amendment Act stipulated that the Poor Law Commission "shall determine the number of guardians which shall be elected in [each parish], having due regard to the circumstances of each parish, provided always that one or more guardians shall be elected for each parish." There was "no proportion set forth in the Act between the population of a parish and the number of guardians to represent it." Representation was far from proportional [58, p. 91]. Instead, "there was drastic and consistent underrepresentation for populous parishes [and] overrepresentation of the more sparsely populated rural parishes," which "ensured control of the boards by the large agricultural landowners" [26, p. 42].

Table 3.1 demonstrates how this worked. Twenty parishes were agglomerated to form the Rye Union in 1835. Two of these parishes had fewer than

150 people (i.e., Broomhill, East Guldeford). Four of these parishes had more than 1,000 people (i.e., Beckley, Brede, Northiam, Rye). Since each parish, however small, was guaranteed at least one guardian, the least populous parishes were allocated more representatives per head of population than the most populous parishes. The least populous parishes also tended to be the wealthiest. Broomhill, for example, had 0.37 percent of the Rye Union's population and 5.56 percent of the Rye Union's guardians—its "guardian-share," therefore, exceeded its "population-share" by a factor of 15. Broomhill was also nearly twice as wealthy as the next wealthiest parish. In this way, the allocation of parishes to Poor Law unions and of guardians to parishes distorted the representation of parishes (and of wealth) on boards of guardians.

This mis-representation was not unique to any one parish or Poor Law union. It was systematic. Figure 3.5 plots the guardian- and population-share of every English parish. The 9,494 *over*-represented parishes (*above* the 45-degree line) had an average population of 627 and an average population-share of 1.72 percent. The 3,994 *under*-represented parishes (*below* the 45-degree line) had an average population of 3,894 and an average population-share of 9.87 percent. Figure 3.6 plots average parish guardian-shares within one hundred evenly-spaced population-share bins. Binning reveals a clear, nearly linear relationship between guardian- and population-share. Parishes containing *less* than five percent of the population of the Poor Law union to which they belonged were, on average, over-represented. Parishes containing *more* than five percent of the population of the Poor Law union to which they belonged were, on average, under-represented—and the greater their population-share, the greater their under-representation. Figures 3.7 and 3.8 demonstrate that over-represented parishes were disproportionately small and disproportionately wealthy.

3.2.3 Guardian Elections

In this section I examine guardian elections, of which 1,842 were held between 1873 and 1875. Figure 3.9 maps them. Elections were held at most once per year and would only be held when the number of candidates exceeded the number of seats (i.e., when seats were "contested"). Only the wealthy could run. Section 38 of the Poor Law Amendment Act tasked the Poor Law Commission to "fix a [property] qualification without which no person shall be eligible [to be elected]." This property qualification could not exceed "£40 annual rental," but the Commission "often selected a figure of £25, which certainly disqualified the majority of [taxpayers] in many parishes."[8] In some extreme cases—in the Brackley Union, for example—the proportion of qualified candidates to total seats was less than ten to one [26, p. 44].

The franchise for the election of Poor Law guardians was distinct from the franchise for the election of members of Parliament, which, in turn, was distinct from the franchise for the election of town councilors in municipalities. Ultimately, what made the Poor Law electoral system "a glaring anomaly" among other English electoral systems was (*i*) *plural voting* and (*ii*) *voting papers* [27, p. 210].

Plural Voting. Section 40 of the Poor Law Amendment Act stipulated that *owners* of property valued at less than £50 "shall have and be entitled to give one vote" and of property valued at more than £50 "shall have [an additional] one vote for every £25...so nevertheless that no [owner] shall be entitled to give more than six votes;" and stipulated that *occupiers* of property valued at less than £200

[8] "Annual rental" refers to the assessed annual value of the property either owned or occupied by, in this case, the person seeking election. See [27, p. 203].

"shall each have a single vote..., at £200 or more, but under £400, shall each have two votes..., and at £400 or more shall each have three votes."[9] Since taxpayers could be both owners and occupiers of property, the wealthiest taxpayers could have as many as nine votes—as many as six votes as owners of property and as many as three votes as occupiers of property. This scale was modified in 1844 so that the wealthiest taxpayers could have as many as twelve votes.[10] But only taxpayers could vote. The poor were, in effect, disenfranchised. Among those ineligible to vote were paupers (i.e., welfare recipients), non-occupiers (i.e., the homeless), occupiers of un-rated property (i.e., occupiers of the least valuable houses/apartments), and occupiers of property for which only the landlord's name appeared in the "rate book" (i.e., "compound tenants" for whom the landlord tendered all taxes and, in so doing, appropriated all votes associated with occupancy) [59, pp. 63-66]. Plural voting was not eliminated until 1894.

Voting Papers. Section 40 of the Poor Law Amendment Act stipulated that votes "be given or taken in writing." So-called "voting papers" were distributed by parish officials to all eligible voters "in the quiet and seclusion of [their] own homes" and collected and tallied thereafter [59, p. 124]. Each paper listed the candidates and included "a place for the voter to write his (or her) choice of the listed candidates, and the number of votes to which the voter was entitled" [27, p. 203]. Voting papers were not, strictly speaking, secret—they "could be examined and challenged by any elector in the union" [27, p. 203]. Although the secret ballot was introduced in municipal and Parliamentary elections by the Ballot Act of 1872, guardian elections continued to be conducted via voting

[9]The scale of voting for owners of property was "taken directly from" the Select Vestries Act (1818), which was "intended to restrict and moderate the public meeting of inhabitants by excluding non-ratepayers and by giving a preponderating weight to such of the wealthier citizens as were present." See [111, p. 166].

[10]See the Poor Law Amendment Act of 1844.

paper until 1894.

Table 3.2 provides an overview of all Poor Law guardian elections held between 1873 and 1875.[11] The number of eligible voters (to whom voting papers were distributed) as a percent of total population was 13.3, as a percent of "families and separate occupiers" was 61.9, and as a percent of "inhabited houses" was 74.5.[12] Voter turnout was high, but hardly universal—80.6 percent of voting papers distributed were actually collected. Elections, moreover, were relatively rare.[13] Elections occurred, on average, only once every 22.2 years. As of November of 1893, for example, nearly one-in-three board chairmen had served as board chairmen for ten or more years [1].

3.3 Empirical Analysis

3.3.1 Data & Summary Statistics

I construct a dataset of 576 Poor Law unions and 13,286 parishes using a variety of sources, including decennial Census Reports and the British Parliamentary Papers. Each parish is matched to the Poor Law union to which it belonged.

[11]Columns (1) through (5) of Table 3.2 distinguish between five types of English parishes: 13,189 elected their own guardians, 490 were combined into pairs that elected common guardians, 63 were divided into "wards" that elected separate guardians, 20 were unrepresented, and 107 were "incorporated" and, therefore, did not hold guardian elections. This yields 13,648 "electoral units" in England. In this essay, I use "electoral unit" and "parish" interchangeably and, for all intents and purposes, they were interchangeable. See Data Appendix for a more detailed explanation.

[12]Records of the number of voting papers distributed and collected in guardian elections are incomplete in the *Return of Contested Elections of Guardians* (1876), and the 1881 Census Report does not enumerate the total population, the number of "families and separate occupiers," or the number of "inhabited houses" within subdivisions of parishes. It is, therefore, impossible to compare voting records with population (or family, or housing) records in 503 of 1,842 elections.

[13]See Table 3.2, Footnote c.

A detailed description of the way in which this dataset is constructed (and the precise source or sources from which each variable is derived) can be found in the Data Appendix. I divide all variables into (*i*) *parish-level variables* and (*ii*) *union-level variables*.

Parish-Level Variables. These variables include population in 1881, rateable value (i.e., property wealth) in 1881, and the number of Poor Law guardians in 1876. Table 3.3 reports the averages of each of these variables across all parishes within each English region. Note that the average Metropolitan London parish was more than ten times more populous and nearly ten times more wealthy than the average English parish. Also note that the average Northern parish was more populous and wealthier than the average Southern or Midland parish.

Union-Level Variables. These variables include area (in acres) in 1881, population in 1881, population density in 1881, whether coal or cotton-textile production was a "special occupation pursued" in 1851, percent of adults working in agriculture in 1881, percent of population that lived in a municipal borough in 1881, percent of members of Parliament that belonged to a conservative party in 1880, percent of population that belonged to any non-conformist (i.e., non-Anglican Protestant) church in 1851, percent of population that attended church services of any denomination in 1851, distance (in km) from an "urban center" (i.e., any of the 20 Poor Law unions that contained, were contained by, or were coextensive with an urban sanitary district of more than 100,000 persons in 1881), distance (in km) from an "urbanizer" (i.e., any of the 20 Poor Law unions within which population grew by more than 75,000 persons between 1851 and 1881), pauperism rate (i.e., paupers per population) in 1881, fraction of paupers relieved indoors (i.e., indoor paupers per total paupers) in 1881, and expendi-

ture (in £) dedicated to outdoor relief per outdoor pauper in 1877-78. Table 3.4 reports the averages of each of these variables across all Poor Law unions within each English region. Note that Metropolitan London Poor Law unions, as with Metropolitan parishes, were disproportionately populous. Note also that conservatism, agriculture, religiosity (i.e., church attendance), and pauperism per capita were concentrated in Southern Poor Law unions, and non-conformism and coal and cotton-textile production were concentrated in Northern Poor Law unions.

3.3.2 Instrumental Variable

My empirical strategy is to isolate exogenous variation in wealth to estimate the *causal* effect of wealth on welfare generosity. The relationship between wealth and welfare generosity is susceptible to obvious confounders. Wealth is correlated with poverty. Wealth is correlated with the capacity to redistribute (both publicly and privately). It is impossible to redistribute wealth that is not expendable. Wealth is almost certainly correlated with other parish- or union-level characteristics for which there is little or no credible data. These competing confounders render OLS analysis problematic. If poverty or the capacity to redistribute or any other parish- or union-level characteristic is correlated with welfare generosity, an ordinary OLS regression of welfare generosity on wealth will yield, at best, a conclusion that is wobbly and, at worst, a conclusion that is outright misleading. In order to overcome this problem, I construct an instrument for wealth. In this essay, I measure wealth as rateable value. All English property was assessed (or "rated") annually by parish administrators to calculate the total tax base on which a tax (the so-called "poor rate") could be levied.

This poor rate financed the Poor Law. My empirical strategy depends on three main assumptions: (*i*) the *definition of the instrument*, (*ii*) the *relevance of the instrument*, and (*iii*) the *exclusion restriction*.

Definition of the Instrument. I assume that boards of guardians represented the "effective wealth," not the "actual wealth," of Poor Law unions. Guardians were elected by parishes to represent the interests of those parishes. Generous parishes elected generous guardians. Parsimonious parishes elected parsimonious guardians. But guardians were not allocated to parishes in proportion to their population and, therefore, the interests of parishes were not represented by boards of guardians in proportion to their population. I define effective and actual wealth according to the following formulae.

$$\text{EFFECTIVE}_u = \left(\frac{\text{G}_u^{p_1}}{\text{G}_u}\right)\left(\frac{\text{RV}_u^{p_1}}{\text{POP}_u^{p_1}}\right) + \cdots + \left(\frac{\text{G}_u^{p_N}}{\text{G}_u}\right)\left(\frac{\text{RV}_u^{p_N}}{\text{POP}_u^{p_N}}\right) \tag{3.1}$$

$$\text{ACTUAL}_u = \left(\frac{\text{RV}_u}{\text{POP}_u}\right) = \left(\frac{\text{POP}_u^{p_1}}{\text{POP}_u}\right)\left(\frac{\text{RV}_u^{p_1}}{\text{POP}_u^{p_1}}\right) + \cdots + \left(\frac{\text{POP}_u^{p_N}}{\text{POP}_u}\right)\left(\frac{\text{RV}_u^{p_N}}{\text{POP}_u^{p_N}}\right) \tag{3.2}$$

The subscript u indexes Poor Law unions and the superscripts p_1 through p_N index parishes 1 through N in Poor Law union u. $\text{G}_u^{p_n}$ denotes the number of Poor Law guardians allocated to parish n in Poor Law union u, G_u denotes the sum of the number of Poor Law guardians allocated to the N parishes in Poor Law union u, $\text{RV}_u^{p_n}$ denotes the rateable value in parish n of Poor Law union u, RV_u denotes the sum of the rateable value in the N parishes in Poor Law union u, $\text{POP}_u^{p_n}$ denotes the population in parish n of Poor Law union u, and POP_u denotes the sum of the population in the N parishes in Poor Law union u. Note that both effective and actual wealth are weighted averages. Effective wealth

weights parishes according to their *guardian*-share and actual wealth weights parishes according to their *population*-share. The difference between effective and actual wealth represents the excess (or deficit) in effective wealth generated by the mis-representation of parishes within Poor Law unions. I decompose effective wealth into actual wealth and the difference between effective and actual wealth according to the following formula.

$$\begin{aligned} \text{EFFECTIVE}_u &= \text{ACTUAL}_u + (\text{EFFECTIVE}_u - \text{ACTUAL}_u) \\ &= \text{ACTUAL}_u + \text{DIFFERENCE}_u \end{aligned} \tag{3.3}$$

Figures 3.10 through 3.13 illustrate the difference between effective and actual wealth. Figure 3.10 maps per capita wealth in each English parish. Figures 3.11, 3.12, and 3.13 map effective wealth, actual wealth, and the difference between effective and actual wealth in each English Poor Law union. Note that the over-representation of the wealthiest parishes within Poor Law unions was *systematic*, but that the degree to which the wealthiest parishes within Poor Law unions were over-represented was *arbitrary*. I isolate this arbitrary variation by instrumenting EFFECTIVE_u with DIFFERENCE_u.

Relevance of the Instrument. I assume that DIFFERENCE_u is correlated with EFFECTIVE_u. Figure 3.14 illustrates this correlation. It is mechanical. Since I decompose EFFECTIVE_u into ACTUAL_u and DIFFERENCE_u, DIFFERENCE_u is mechanically correlated with EFFECTIVE_u. Figure 3.15 illustrates that DIFFERENCE_u, as a share of EFFECTIVE_u, varied markedly across Poor Law unions: wealthy parishes were more or less mis- or over-represented across Poor Law unions. DIFFERENCE_u makes up, on average, 23.8 percent of EFFECTIVE_u. But DIFFERENCE_u is negative in 13 Poor Law unions. In these Poor Law

unions, relatively richer parishes were, on average, actually under-represented (i.e., their population-shares, on average, exceeded their guardian-shares). And DIFFERENCE_u is zero in 26 Poor Law unions. These Poor Law unions consisted of a single parish and, as such, these parishes were, by definition, neither be over- nor under-represented. And DIFFERENCE_u makes up more than 50 percent of EFFECTIVE_u in 42 Poor Law unions. In these Poor Law unions, the over-representation of wealthy parishes was so egregious that the wealth represented by their boards of guardians was more than double their actual wealth.

Exclusion Restriction. I assume that DIFFERENCE_u affects welfare generosity *only* through EFFECTIVE_u—that DIFFERENCE_u is uncorrelated with any other variable that affects EFFECTIVE_u. Although this assumption is, in principle, untestable, my dataset suggests that it holds in practice. Figure 3.16 illustrates that few union-level variables (among an admittedly incomplete set of union-level variables) in my dataset are correlated with DIFFERENCE_u. Table 3.5 quantifies these pairwise correlations. Columns (1) and (2) of Table 3.5 illustrate that EFFECTIVE_u is correlated with many—indeed, nearly all—union-level variables, but that DIFFERENCE_u is not. This is the point of the instrument. It is, by design, randomly (or approximately randomly) distributed across Poor Law unions.

3.3.3 IV Model & Results

In this section, I estimate a two-stage least squares regression. In the first stage, I predict EFFECTIVE_u (the treatment variable) using DIFFERENCE_u (the instrumental variable). In the second stage, I use the predicted values of EFFECTIVE_u

to estimate the effect of effective wealth on welfare generosity. Formally, I define the first and second stages according to the following formulae.

$$\text{EFFECTIVE}_u = \alpha_0 + \alpha_1 \text{DIFFERENCE}_u + \alpha_2 \mathbf{X}_u + \epsilon_u \tag{3.4}$$

$$\text{WGEN}_u = \beta_0 + \beta_1 \text{EFFECTIVE}_u + \beta_2 \mathbf{X}_u + \mu_u \tag{3.5}$$

The subscript u indexes Poor Law unions. EFFECTIVE_u and DIFFERENCE_u are defined as before. WGEN_u denotes welfare generosity. WGEN_u takes two forms: (*i*) the proportion of paupers relieved in workhouses in union u and (*ii*) average relief (in £) granted to paupers not relieved in workhouses in union u. I run separate regressions for each. $\mathbf{X}_u$ is a vector of union-level covariates. ϵ_u and μ_u are error terms. Each observation is weighted by population. The coefficient of interest is β_1—the effect of effective wealth on welfare generosity.

Columns (1) and (2) of Table 3.6 report the results of Equation 3.4. These results confirm that the relationship between DIFFERENCE_u and EFFECTIVE_u is strong. The first-stage F-statistic exceeds 1,000. Columns (3) through (6) of Table 3.6 report the results of Equation 3.5. These results are twofold. First, there was no causal relationship between wealth and workhouse use. Relatively wealthier Poor Law unions were no more or less likely to relieve welfare applicants in workhouses than relatively poorer Poor Law unions. Second, the causal relationship between wealth and payments to outdoor paupers was positive, but was negligibly small. The difference in EFFECTIVE_u between the Poor Law union at the 25th percentile and the Poor Law union at the 75th percentile was £4.32. This difference, given β_1, yields a difference in payments to outdoor paupers of less than two-and-a-half shillings per outdoor pauper per year, or the

equivalent of only two quarts of "good mutton soup" per outdoor pauper per year [16, pp. 90-91].

All told, these results are surprising. Wealth did *not* meaningfully affect welfare generosity. In this narrow sense, there was *not* class antagonism. Wealthy people or places in England in 1881 were *not* disproportionately likely to use the workhouse or to pay less per day to paupers not relieved in workhouses. Moreover, the relationship between church attendance (irrespective of denomination) and welfare generosity is noteworthy. Poor Law unions in which church attendance was especially high were decidedly less likely to relieve paupers in workhouses and spent decidedly more per outdoor pauper per year. Although this relationship cannot be called causal, it might be suitable for further study.

3.4 A New Measure of Wealth Skewness

The guardian election data that I introduce in Section 3.2.3 enable me to construct a crude but hyper-local measure of wealth skewness. Formally, I define wealth skewness according to the following formula.

$$\text{SKEW}_p = \text{P\_RVPERCAP}_p - \text{P\_\%ELIG}_p \tag{3.6}$$

The subscript p indexes parishes. P_RVPERCAP_p denotes the percentile of rateable value per capita into which parish p fell and $\text{P\_\%ELIG}_p$ denotes the percentile of eligible voters per capita in guardian elections into which parish p fell. Since SKEW_p is defined as the difference between percentiles, it is a measure of *relative* wealth skewness—it pits parishes against one another. For a given per-

centile of eligible voters per capita, a greater percentile of rateable value per capita implies relatively greater wealth skewness. Take, for example, the Easingwold parish in the Easingwold Poor Law union in Yorkshire and the Benfieldside parish in the Lanchester Poor Law union in Durham. Both parishes fell into the 50th percentile of eligible voters per capita, but fell into the 75th and 8th percentile, respectively, of rateable value per capita. As such, it must be that the Easingwold parish had a greater proportion of *very* wealthy people than the Benfieldside parish and, therefore, that the wealth distribution of the Easingwold parish must be more rightwardly skewed than the wealth distribution of the Benfieldside parish. Conversely, for a given percentile of rateable value per capita, a lower percentile of eligible voters per capita implies relatively greater wealth skewness. Take, for example, the Battersea parish in the Wandsworth and Clapham Poor Law union in Surrey and the East Leake parish in the Loughborough Poor Law union in Leicester. Both parishes fell into the 50th percentile of rateable value per capita, but fell into the 1st and 94th percentile, respectively, of eligible voters per capita. As such, it must be that the Battersea parish had a greater proportion of *very* wealthy people than the East Leake parish and, therefore, that the wealth distribution of the Battersea parish must be more rightwardly skewed than the wealth distribution of the East Leake parish.

Panel A of Table 3.7 reports average SKEW_p (by region) across all parishes that held at least one guardian election between 1873 and 1875 (of which there were 1,078). Only in these parishes do I observe guardian election data and, therefore, only in these parishes can I calculate SKEW_p. I find that wealth skewness was singularly high among parishes in Metropolitan London and was significantly higher among parishes in the South of England than among parishes

in the Midlands or in the North of England.[14] But there is reason to doubt these regional averages. The parishes that held at least one guardian election were patently unrepresentative of their respective regions. They were disproportionately poorer and more populous. In order to impute SKEW_p for parishes that *did not* hold at least one guardian election, I estimate the relationship between eligible voters per capita and various parish characteristics using parishes that *did* hold at least one guardian election. Formally, I estimate the following formula.

$$\%\text{ELIG}_p = \mu_0 + \mu_1 \mathbf{X}_p + \mu_2 \mathbf{X}_p^u + \epsilon_p \tag{3.7}$$

The subscript p indexes parishes and the superscript u indexes Poor Law unions. $\mathbf{X}_p$ is a vector of *parish*-level variables. These include population, population-share, number of Poor Law guardians, and guardian-share. $\mathbf{X}_p^u$ is a vector of *union*-level variables. These include population density, coal production, cotton-textile production, distance from urban centers, distance from "urbanizers," percent of adults in agriculture, percent municipal borough, percent conservative, percent non-conformist, percent church attendance, and pauperism rate. Union-level variables are common across all parishes within a Poor Law union. Figure 3.17 demonstrates that these variables, collectively, constitute a useful but imperfect predictor of eligible voters per capita. $\mathbf{X}_p$ and $\mathbf{X}_p^u$ explain 13.45 percent of the variation in $\%\text{ELIG}_p$. I re-construct $\text{P\_}\%\text{ELIG}_p$ using $\%\text{ELIG}_p$ for parishes *with* guardian election data and $\widehat{\%\text{ELIG}}_p$ for parishes *without* guardian election data. I then re-construct RVPERCAP_p using all parishes. This yields a new, modified version of SKEW_p.

[14] Since SKEW_p is a *relative* measure of wealth skewness, average SKEW_p is, by construction, approximately zero across *all* parishes.

Panel B of Table 3.7 reports average SKEW_p (by region) across all parishes. This new, modified version of SKEW_p suggests, as before, that wealth skewness was singularly high among parishes in Metropolitan London, but that, unlike before, wealth skewness was significantly higher among parishes in the North of England than among parishes in the South of England. Figure 3.18 maps SKEW_p by parish. It demonstrates that East Anglia, the South West Peninsula, and the rural North of England were, on the whole, more egalitarian than London, Metropolitan London, and the industrial North of England.

3.5 Conclusion

The trouble with estimating the effect of wealth on almost anything is that wealth is correlated with almost everything. Wealth is correlated with poverty. Wealth is correlated with charity. Wealth is correlated with the capacity to redistribute. As such, it is difficult to disentangle the effect of wealth on welfare generosity and the effect of poverty, charity, and the capacity to redistribute, among other variables, on welfare generosity. In this essay, I make three main contributions. First, I introduce a new dataset of English Poor Law unions that includes economic variables, political variables, religious variables, and geographical variables. I also match each English parish to the Poor Law union to which it belonged. Second, I isolate variation in wealth in England in 1881 that is plausibly unrelated to variables that are related to welfare generosity. My instrumental variables regression suggests that there is no relationship between wealth and welfare generosity. Third, I construct a new parish-level measure of wealth skewness that is made possible by a new dataset of Poor Law guardian elections. Although admittedly crude, this measure demonstrates that

Metropolitan London and industrial areas in the North of England were more unequal than the rest of England.

3.6 Tables & Figures

Table 3.1: Proposed Guardian Allocation of the Rye Union (1835)

	Total Population (1)	No. of Guardians (2)	Guardians per 1,000 (3)	Population Share (%) (4)	Guardian Share (%) (5)	RV per Capita (£) (6)
Beckley	1,447	2	1.38	12.71	11.11	2.01
Brede	1,046	2	1.91	9.18	11.11	2.04
Broomhill	42	1	23.80	0.37	5.56	53.52
Guldeford	126	1	7.94	1.11	5.56	27.82
Icklesham	604	1	1.66	5.30	5.56	5.83
Iden	517	1	1.93	4.54	5.56	4.94
Northiam	1,448	2	1.38	12.72	11.11	2.42
Peasemarsh	920	1	1.09	8.08	5.56	1.99
Playden	297	1	3.37	2.61	5.56	4.15
Rye	3,715	4	1.08	32.62	22.22	1.20
Udimore	454	1	2.20	3.99	5.56	3.23
Winchelsea	772	1	1.30	6.78	5.56	1.83
Total	**11,388**	**18**	**1.58**	**100**	**100**	†

Source: [3].

† Union-wide rateable value per capita can be calculated in two ways. If one weights each parish's rateable value by its *population share* (or, equivalently, if one divides total union rateable value by total union population), then the ratable value per capita of the Rye union in 1835 was £2.70 per person. I call this "actual" rateable value per capita. If, on the other hand, one weights each parish's ratable value by its *guardian share*, then the rateable value per capita of the Rye union in 1835 was £6.73 per person. I call this "effective" rateable value per capita—it is the wealth that is represented by or embedded in the union's board of guardians.

Table 3.2: Guardian Elections (1873-75)

	"Normal" Parishes (1)	Combined Parishes (2)	Divided Parishes (3)	Un-Rep. Parishes (4)	Incorp. Parishes (5)	All Parishes (6)
No. of Parishes	13,189	490	63	20	107	13,869
Avg. Population	1,578	467	53,583	244	2,513	1,799
Avg. RV per Capita (£)	11.13	42.86	4.55	27.51	10.54	12.24
No. of Electoral Units	13,189	245	212	0	0	13,648
Units with Election(s)[a]	982	21	132	0	0	1,135
1 Election[a]	599	15	40	0	0	654
2 Elections[a]	213	3	39	0	0	255
3 Elections[a]	170	3	53	0	0	226
Total Elections[a]	1,535	30	277	0	0	1,842
Total Elections w/ Data[b]	1,319	20	0	0	0	1,339
Total Papers Distributed[b]	2,302,726	13,138	-	-	-	2,315,864
As % of Population[b]	13.3%	19.7%	-	-	-	13.3%
As % of Families[b]	61.8%	94.4%	-	-	-	61.9%
As % of Houses[b]	74.4%	99.5%	-	-	-	74.5%
Total Papers Collected[b]	1,856,007	11,679	-	-	-	1,867,686
Voter Turnout[b]	80.5%	88.9%	-	-	-	80.6%
Years b/w Elections[c]	25.78	24.50	2.30	-	-	22.23

Source: Return of Contested Elections of Guardians (1876), *Decennial Census Report* (1881), *Poor Rate Valuation* (1882).

Table 3.2: *Cont'd*

Notes: Of the 13,869 parishes in England, 13,189 (95.1%) functioned as autonomous units for the election of guardians, 490 (3.5%) were combined into pairs for the election of guardians, 63 (0.5%) were divided into between two and eight "wards" for the election of guardians, 20 (0.1%) were unrepresented by guardians, and 107 (0.8%) were federated into "incorporations" which, under Local Acts of Parliament, prescribed lifetime-guardians that were appointed rather than elected. As such, the number of "electoral units" in England (13,648) differed somewhat from the number of parishes in England (13,869). Parishes that were combined tended to be relatively rich and sparsely populated. Parishes that were divided tended to be relatively poor and densely populated.

[a] The row entitled "Units with Election(s)" enumerates the total number of electoral units in a given column that held at least one guardian election between 1873 and 1875. Since elections could be held at most once per year per electoral unit (and would only be held—or "contested"—when the number of candidates exceeded the number of seats apportioned to the electoral unit), each electoral unit could have at most three elections between 1873 and 1875. In all, only 1,135 of 13,869 English electoral units held at least one election during this period—654 held one election, 255 held two elections, and 226 held three elections. This amounts to 1,842 total elections.

[b] Guardian elections were conducted using "voting papers" which would be distributed to all eligible voters at their places of residence and collected and tallied thereafter. Records of the number of voting papers distributed and collected in guardian elections are incomplete in the 1876 Return of Contested Elections, and the 1881 Census Report does not enumerate the population, the number of "families and separate occupiers," or the number of houses within subdivisions of parishes. It is therefore possible for only 1,339 of 1,842 elections to compare voting records with population records (as enumerated in the row entitled "Total Elections w/ Data"). I calculate "voter turnout" as the percentage of eligible voters (i.e., voting papers distributed) that voted (i.e., voting papers collected).

[c] I observe 1,842 elections in 13,648 electoral units over three years (or, equivalently, 40,944 electoral unit-years). This yields 0.045 elections per electoral unit-year. I define the *implied* number of years between elections as the number of electoral unit-years per election (according to the formula below):

$$\text{Years Between Elections} = \frac{\text{No.of Electoral Unit-Years}}{\text{No.of Elections}} = \frac{3 \times \text{No.of Electoral Units}}{\text{No.of Elections}}$$

Table 3.3: Parish Attributes (by Region)

	Metro London† (1)	South England† (2)	The Midlands† (3)	North England† (4)	All England (5)
Population	47,656	1,154	1,303	2,471	**1,823**
RV per Capita	14.82	8.52	11.40	12.17	**10.57**
Guardians	7.24	1.38	1.34	1.34	**1.39**
Obs.	79	4,803	4,958	3,363	**13,203**††

Sources: Return of Contested Elections of Guardians (1876), *Decennial Census Report* (1881), *Poor Rate Valuation* (1882).

Notes: This table reports the average population, the average rateable value (i.e., property wealth) per capita, and the average number of Poor Law guardians across English parishes within English regions.

† I define "Metro London" as the Metropolitan London Census Division (i.e., Census Division I), "South England" as the South Eastern, Eastern, and South Western Census Divisions (i.e., Census Divisions II, IV, V), "The Midlands" as the South Midlands, West Midlands, and North Midlands Census Divisions (i.e., Census Divisions III, VI, VII), and "North England" as the North Western, Yorkshire, and Northern Census Divisions (i.e., Census Divisions VIII, IX, X). See Data Appendix for an explanation of English local government areas.

†† I drop the 83 almost infinitesimally small parishes (geographically speaking) that made up the City of London Poor Law union. This accounts for the difference between the 13,203 parishes that I observe above and the 13,286 parishes that are in my "full" dataset.

Table 3.4: Poor Law Union Attributes (by Region)

	Metro London† (1)	South England† (2)	The Midlands† (3)	North England† (4)	All England (5)
No. of Parishes	6.04	21.16	25.43	26.48	**23.07**
Area	2,799	52,437	55,727	68,411	**54,746**
Population	141,339	24,867	33,071	55,727	**41,995**
Population Density	104.77	2.33	2.17	4.33	**7.52**
Coal Production	0.00	0.02	0.21	0.35	**0.15**
Cotton Production	0.00	0.00	0.03	0.27	**0.07**
Distance from "Urban Centers"	4.58	61.09	41.16	32.13	**45.30**
Distance from "Urbanizers"	4.58	75.92	55.76	38.99	**57.61**
Percent Agriculture	0.74	26.32	23.61	17.32	**22.22**
Percent Municipal Borough	51.53	6.30	5.34	6.03	**6.43**
Percent Conservative	33.09	78.33	54.63	38.00	**59.30**
Percent Non-Conformist	††	36.49	40.76	53.99	**42.05**
Percent Church Attendance	††	70.18	67.34	52.11	**64.99**
Pauperism Rate	0.028	0.043	0.036	0.025	**0.036**
Fraction of Paupers Relieved Indoors	0.560	0.192	0.192	0.207	**0.213**
Expenditure per Outdoor Pauper	4.21	4.97	4.67	4.16	**4.65**
Obs.	27	227	195	127	**576**

Sources: See Data Appendix.

Table 3.4: *Cont'd*

Notes: The above table reports the average number of parishes, the average area (in acres), the average population, the average population density (i.e., population per acre), the average percent of adults working in agriculture, the average percent of population that lived in a municipal borough, the average percent of members of Parliament that belonged to a conservative party, the average percent of the population that belonged to a non-Anglican Protestant church, the average percent of the population that attended church services of any denomination, the average distance (in kilometers) from "urban centers" (defined as any of the 20 Poor Law unions that contained, were contained by, or were coextensive with an urban sanitary district of more than 100,000 persons in 1881), the average distance (in kilometers) from "urbanizers" (defined as any of the 20 Poor Law unions within which population grew by more than 75,000 persons between 1851 and 1881), the pauperism rate (i.e., paupers per population), the fraction of paupers relieved indoors (i.e., indoor paupers per total paupers), and the average expenditure (in pounds) dedicated to outdoor relief per outdoor pauper across English Poor Law unions within English regions. "Coal Production" and "Cotton-Textile Production" report the percent of Poor Law unions in each region in which coal or cotton-textiles were "special occupations pursued."

† I define "Metro London" as the Metropolitan London Census Division (i.e. Census Division I), "South England" as the South Eastern, Eastern, and South Western Census Divisions (i.e. Census Divisions II, IV, V), "The Midlands" as the South Midlands, West Midlands, and North Midlands Census Divisions (i.e. Census Divisions III, VI, VII), and "North England" as the North Western, Yorkshire, and Northern Census Divisions (i.e. Census Divisions VIII, IX, X). See Data Appendix for an explanation of English local government areas.

†† These data are missing. As such, only the 549 non-Metropolitan London unions are included.

Table 3.5: Correlations Between DIFFERENCE, EFFECTIVE, and Poor Law Union Attributes

	Log RV per Cap., Diff.	Log RV per Cap., Eff.	Population Density	Cotton Production	Coal Production	Dist. from Urban	Dist. from Urbanizers	% Agric.	% Mun. Borough	% Cons.	% Non-Conformist	% Church Attendance
Log RV per Cap., Diff.	**1.00**	-	-	-	-	-	-	-	-	-	-	-
Log RV per Cap., Eff.	**0.80***	**1.00**	-	-	-	-	-	-	-	-	-	-
Population Density	**-0.07**	**-0.11***	1.00	-	-	-	-	-	-	-	-	-
Cotton Production	**-0.09**	**-0.15***	-0.01	1.00	-	-	-	-	-	-	-	-
Coal Production	**0.01**	**-0.11***	-0.08	0.17*	1.00	-	-	-	-	-	-	-
Dist. from Urban	**0.12***	**0.17***	-0.30*	-0.17*	-0.25*	1.00	-	-	-	-	-	-
Dist. from Urbanizers	**0.06**	**0.03**	-0.25*	-0.19*	-0.15*	0.65*	1.00	-	-	-	-	-
% Agric.	**0.16***	**0.42***	-0.37*	-0.25*	-0.32*	0.54*	0.39*	1.00	-	-	-	-
% Mun. Borough	**-0.09**	**-0.29***	0.04	0.20*	0.05	-0.11*	-0.07	-0.48*	1.00	-	-	-
% Cons.	**0.07**	**0.22***	-0.21*	-0.24*	-0.24*	0.25*	0.10	0.42*	-0.33*	1.00	-	-
% Non-Conformist	**-0.09**	**-0.23***	0.18*	0.24*	0.33*	-0.20*	-0.04	-0.34*	0.20*	-0.44*	1.00	-
% Church Attendance	**0.04**	**0.08**	-0.20*	-0.25*	-0.32*	0.30*	0.19*	0.30*	-0.20*	0.19*	0.03	1.00

Notes: In the above table I plot pairwise correlation coefficients between my treatment variable (i.e., "effective" wealth), my instrumental variable (i.e., the difference between "effective" and "actual" wealth), and a variety of covariates measured at the Poor Law union-level. An asterisk indicates that these pairwise correlation coefficients are statistically distinguishable from zero at a 99 percent confidence level. First, it is worth noting that the correlation between my treatment and instrumental variables is both large and statistically significant (i.e., 0.80). Second, I have bolded the first and second columns in order to distinguish the (many) statistically significant correlations between my treatment variable and various covariates from the (few) statistically significant correlations between my instrumental variable and the same covariates. Third, the two statistically significant (albeit relatively small) correlations that exist between my instrumental variable and these covariates (i.e., distance from urban centers and percent agriculture) vanish when excluding the 65 unions that do not fall within two standard deviations from the mean of my instrumental variable.

Table 3.6: Effect of Wealth on Welfare Generosity (2SLS Regression)

	First Stage		Second Stage			
	(1)	(2)	(3)	(4)	(5)	(6)
RV per Capita, Effective			0.000	0.001	0.027*	0.023
			(0.001)	(0.001)	(0.013)	(0.013)
RV per Capita, Difference	1.148**	1.102**				
	(0.018)	(0.019)				
Population Density	0.044**	0.048**	0.003**	0.002**	0.003	0.005
	(0.004)	(0.004)	(0.000)	(0.000)	(0.003)	(0.003)
Coal Production	-0.265	-0.297*	-0.033**	-0.042**	-0.267*	-0.063
	(0.141)	(0.145)	(0.008)	(0.009)	(0.114)	(0.114)
Cotton Production	-0.012	-0.243	0.062**	0.052**	-0.545**	-0.061
	(0.146)	(0.178)	(0.009)	(0.011)	(0.118)	(0.140)
Dist. from Urban Centers	0.001	0.002	0.000*	0.000*	0.003	-0.001
	(0.003)	(0.003)	(0.000)	(0.000)	(0.002)	(0.002)
Dist. from Urbanizers	-0.006**	-0.003	0.000**	0.000**	-0.001	0.000
	(0.002)	(0.002)	(0.000)	(0.000)	(0.001)	(0.001)
Percent Agriculture	0.073**	0.070**	-0.001	0.000	0.028**	0.031**
	(0.006)	(0.006)	(0.000)	(0.000)	(0.005)	(0.005)
Percent Borough	-0.891**	-0.977**	0.043**	0.040**	-0.216	0.051
	(0.203)	(0.196)	(0.012)	(0.012)	(0.164)	(0.154)
Percent Conservative	0.349*	0.433*	0.026**	0.014	0.045	0.195
	(0.164)	(0.174)	(0.010)	(0.010)	(0.133)	(0.137)

Table 3.6: *Cont'd*

	First Stage		Second Stage			
	(1)	(2)	(3)	(4)	(5)	(6)
Percent Non-Conformist	-1.21*	-2.97**	-0.100**	-0.003	-0.135	-0.519
	(0.483)	(0.542)	(0.029)	(0.033)	(0.391)	(0.435)
Percent Church Attendance	-0.338	0.942*	-0.061**	-0.063*	1.770**	1.688**
	(0.379)	(0.414)	(0.022)	(0.025)	(0.306)	(0.327)
Dependent Variable	EFF	EFF	INFRAC	INFRAC	EXPND	EXPND
Regional Fixed Effects		✓		✓		✓
Observations	549	549	549	549	549	549
R-Squared	0.904	0.917	0.513	0.564	0.459	0.552

Notes: Columns (1) and (2) report the results of Equation 3.4. Columns (3) through (6) report the results of Equation 3.5. The dependent variable in Columns (3) and (4) is the fraction of paupers relieved indoors and the dependent variable in Columns (5) and (6) is average relief granted to outdoor paupers. Note that I exclude all 27 Metropolitan London Poor Law unions. Columns (2), (4), and (6) include census division fixed effects. EFF denotes effective rateable value per capita, INFRAC denotes the proportion of paupers relieved in workhouses, and EXPND denotes average relief (in pounds) granted to paupers not relieved in workhouses.

** Significant at the 1 percent level.

* Significant at the 5 percent level.

Table 3.7: Wealth Skewness (by Region)

	Metro London† (1)	South England† (2)	The Midlands† (3)	North England† (4)	All England (5)
Panel A. Parishes with Poor Law Elections					
Skewness	50.69	0.38	-5.67	-0.70	**0.00**
Population	71,953	10,779	10,536	13,431	**22,562**
RV per Capita	7.74	5.60	5.96	5.82	**6.37**
Obs.	45	317	364	352	**1,078**††
Panel B. All Parishes					
Skewness †††	33.53	-9.96	2.27	10.22	**-0.01**
Population	47,656	1,131	1,294	2,471	**1,817**
RV per Capita	14.82	8.55	11.34	12.17	**10.57**
Obs.	79	4,714	4,939	3,363	**13,095**††

Sources: Return of Contested Elections of Guardians (1876), *Decennial Census Report* (1881), *Poor Rate Valuation* (1882).

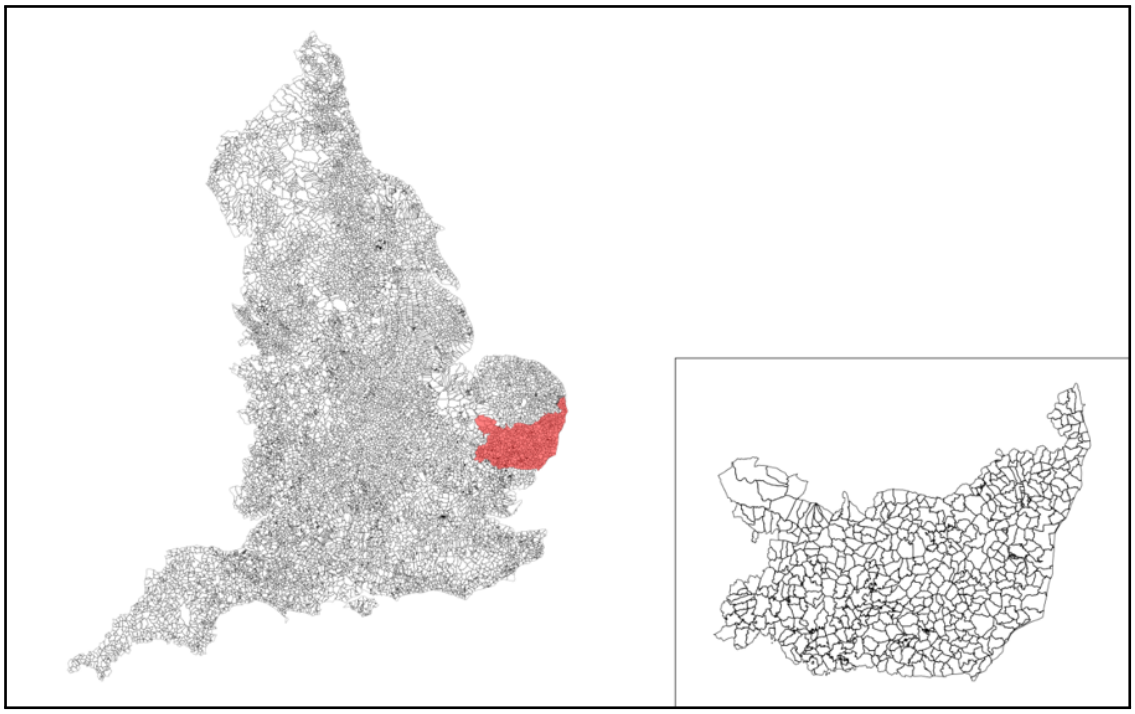
Notes: The above table reports average wealth skewness (as defined in Equation 3.6), average population, and average rateable value (i.e., property wealth) per capita across English parishes. Panel A reports these averages across parishes that held at least one guardian election between 1873 and 1875. Only in these parishes do I observe guardian election data and, therefore, only in these parishes can I calculate wealth skewness directly. Panel B reports the same averages across *all* English parishes. In this case, I calculate "predicted" wealth skewness in parishes that did not hold a guardian election between 1873 and 1875. See Section 3.4 for calculations.

† I define "Metro London" as the Metropolitan London Census Division (i.e., Census Division I), "South England" as the South Eastern, Eastern, and South Western Census Divisions (i.e,. Census Divisions II, IV, V), "The Midlands" as the South Midlands, West Midlands, and North Midlands Census Divisions (i.e., Census Divisions III, VI, VII), and "North England" as the North Western, Yorkshire, and Northern Census Divisions (i.e., Census Divisions VIII, IX, X). See Data Appendix for an explanation of English local government areas.

†† I drop the 83 infinitesimally small parishes—geographically speaking—that made up the City of London Poor Law union. I also combine all parishes that were divided into wards for the purposes of guardian elections. These modifications account for the difference between the 13,095 parishes that I observe in the above table and the 13,286 parishes that make up my "full" dataset.

††† *Predicted* wealth skewness.

Figure 3.1: English Civil Parishes



Source: *Great Britain Historical GIS Project* (2011).

Notes: Pictured above are the boundaries of every parish in England in 1881, of which there were 13,869. The inset depicts and magnifies the county of Suffolk (also pictured in red in the main panel).

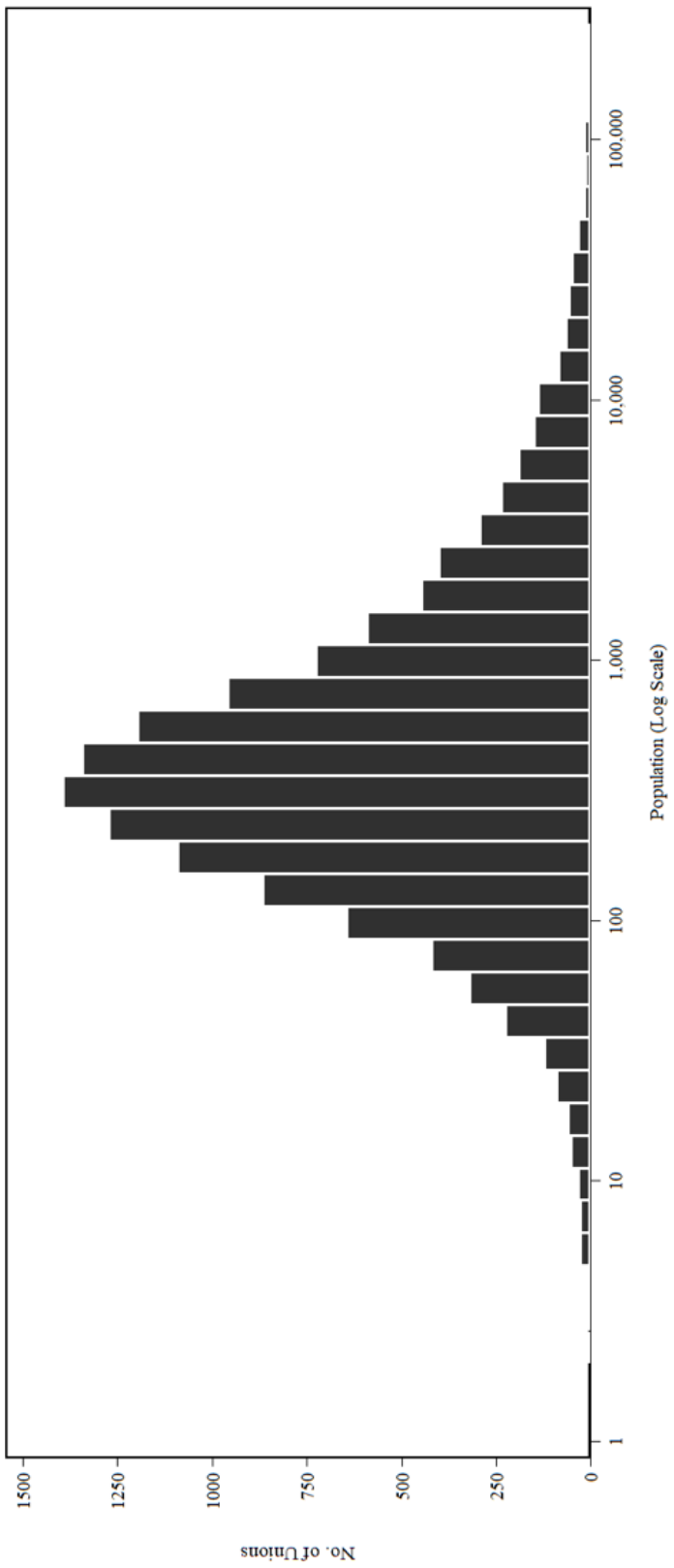
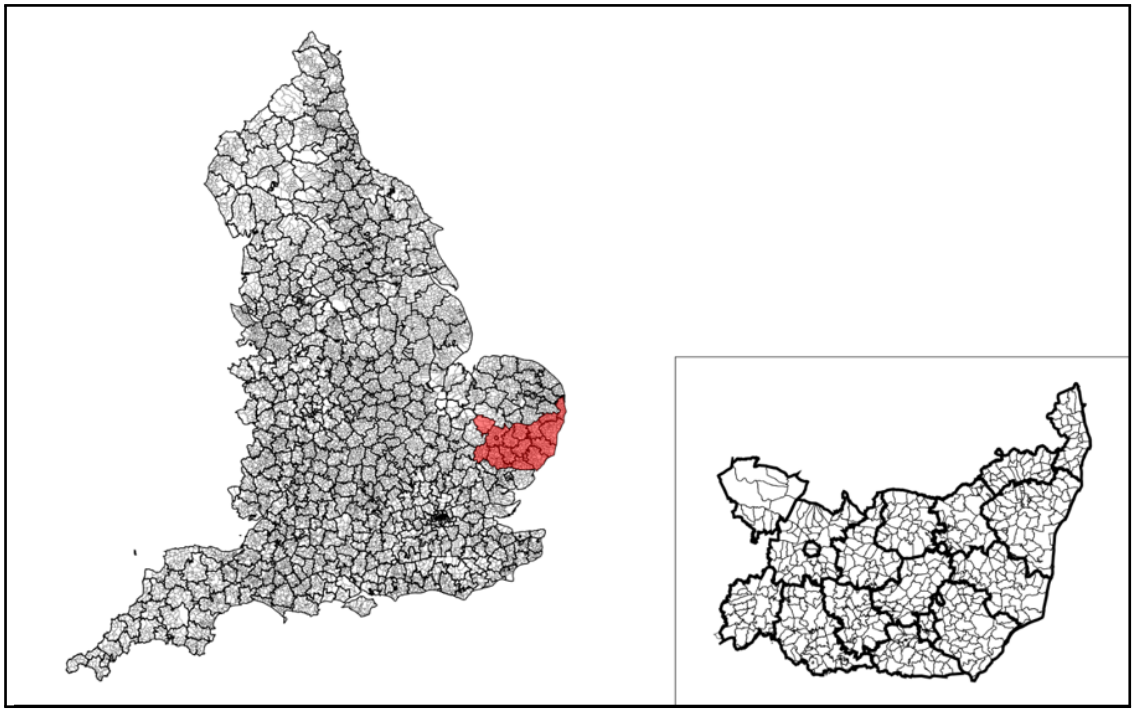


Figure 3.2: Histogram of Population per Parish

Figure 3.3: English Poor Law Unions



Source: *Great Britain Historical GIS Project* (2011).

Notes: Pictured above are the boundaries of every Poor Law union in England in 1881, of which there were more than 600, and the boundaries of the parishes of which they consisted. The average English Poor Law union consisted of 23 parishes (see Figure 3.4). The inset depicts and magnifies the county of Suffolk (also pictured in red in the main panel).

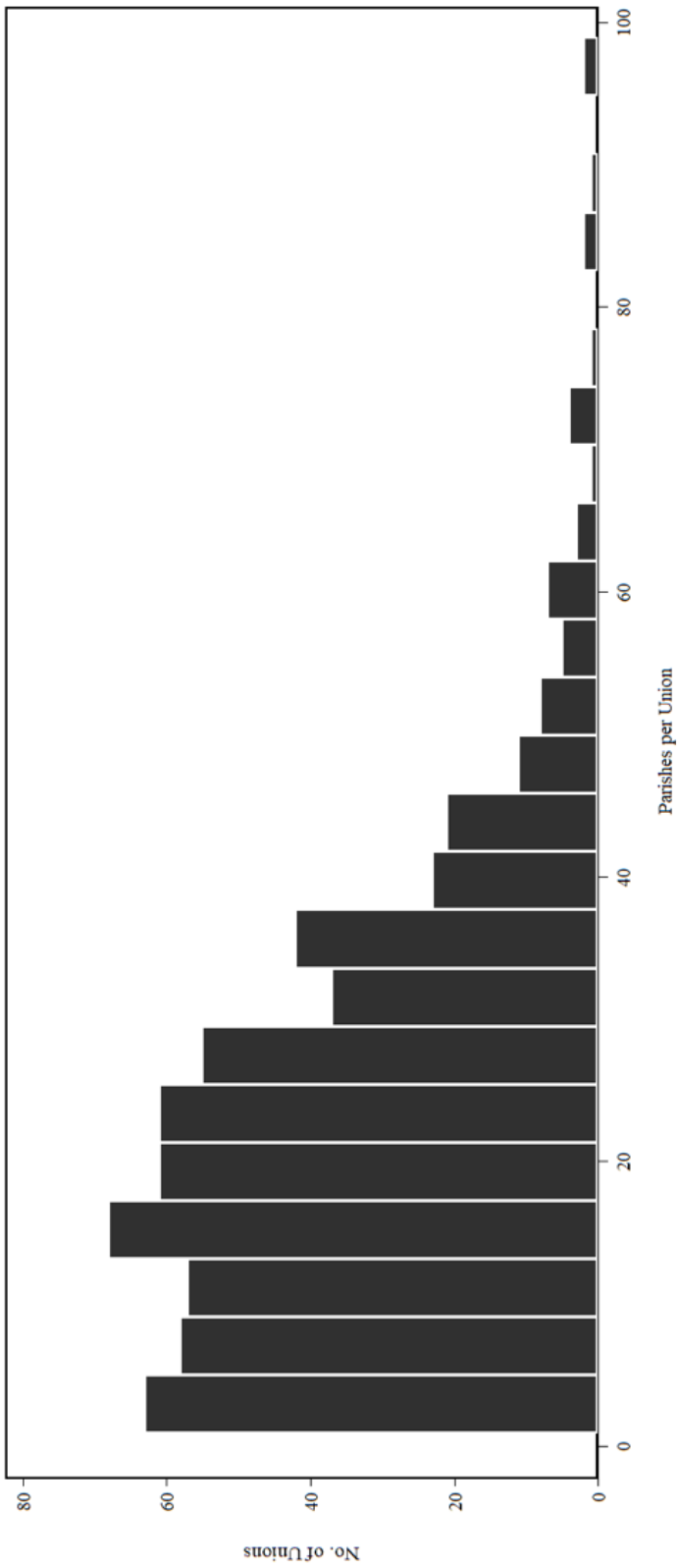
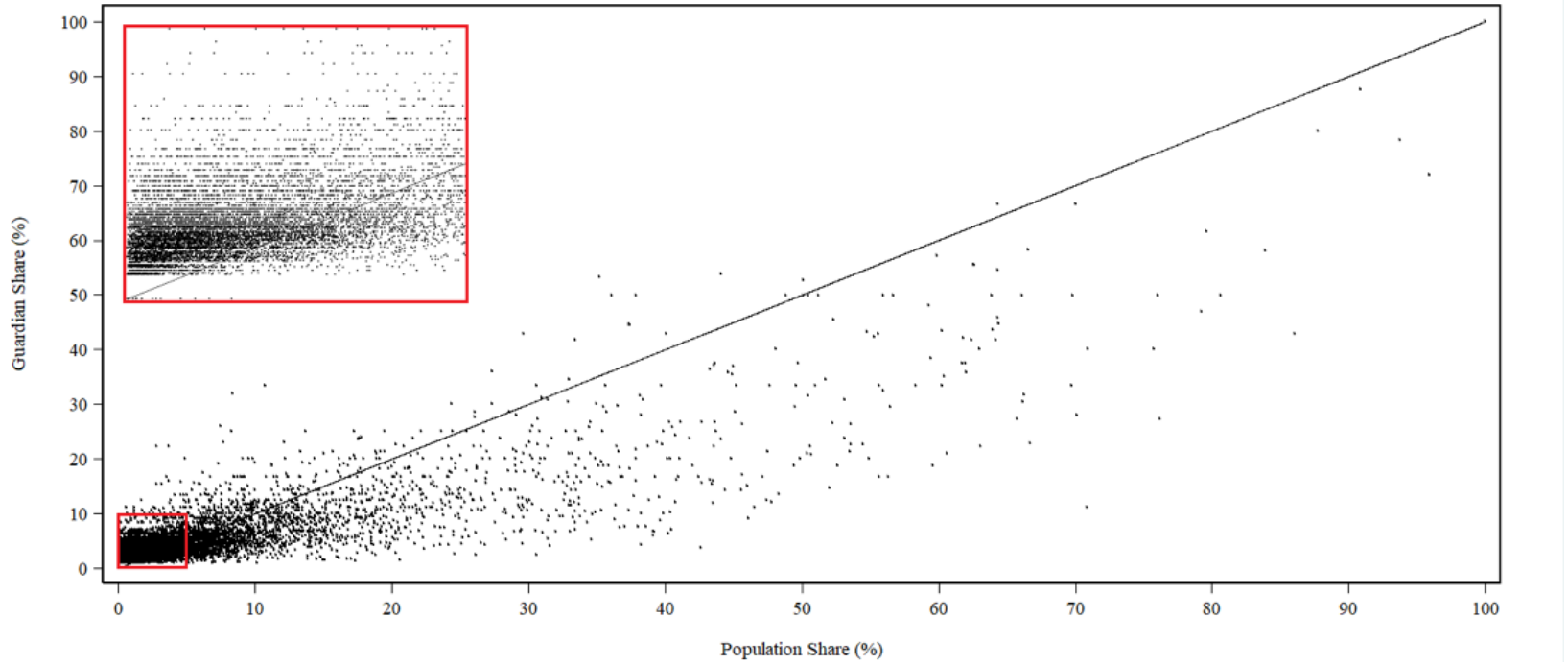


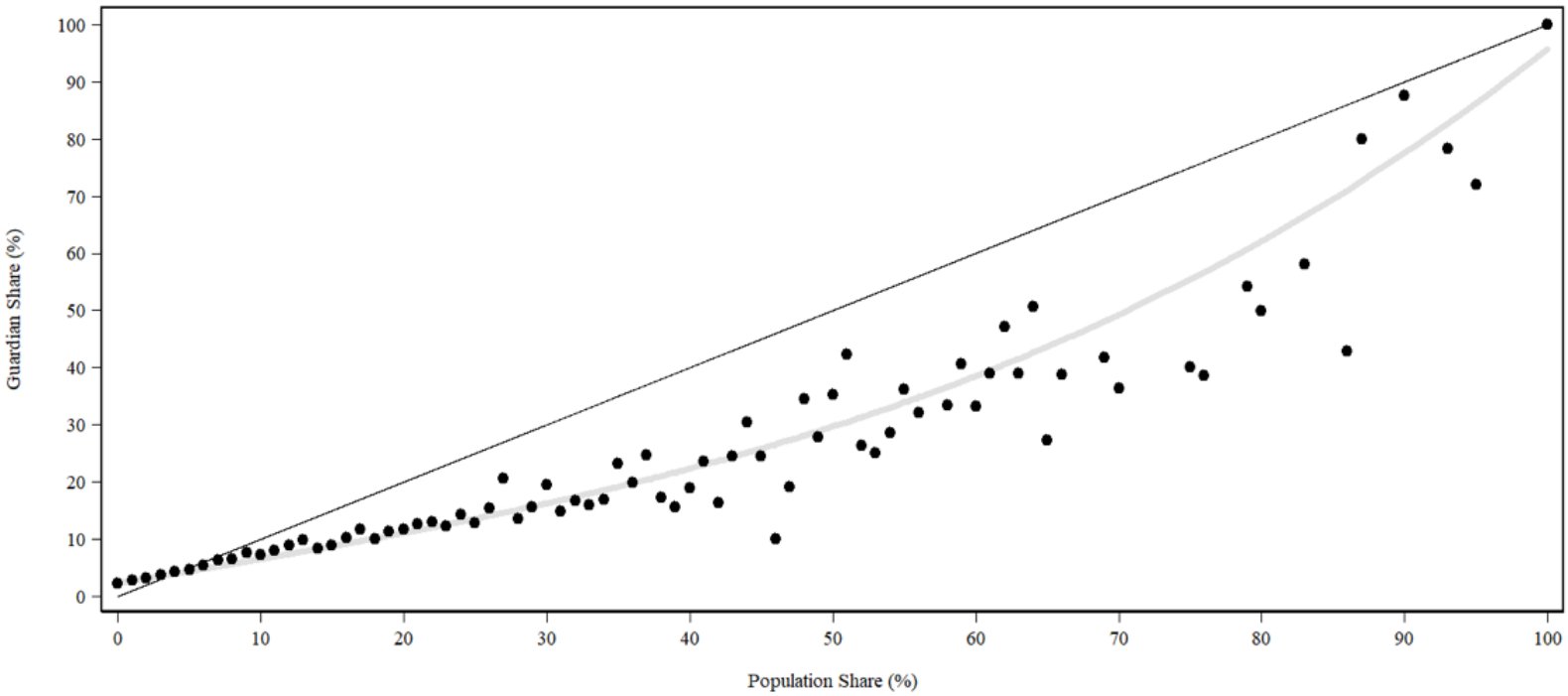
Figure 3.4: Histogram of Parishes per Union

Figure 3.5: Guardian-Share by Population-Share



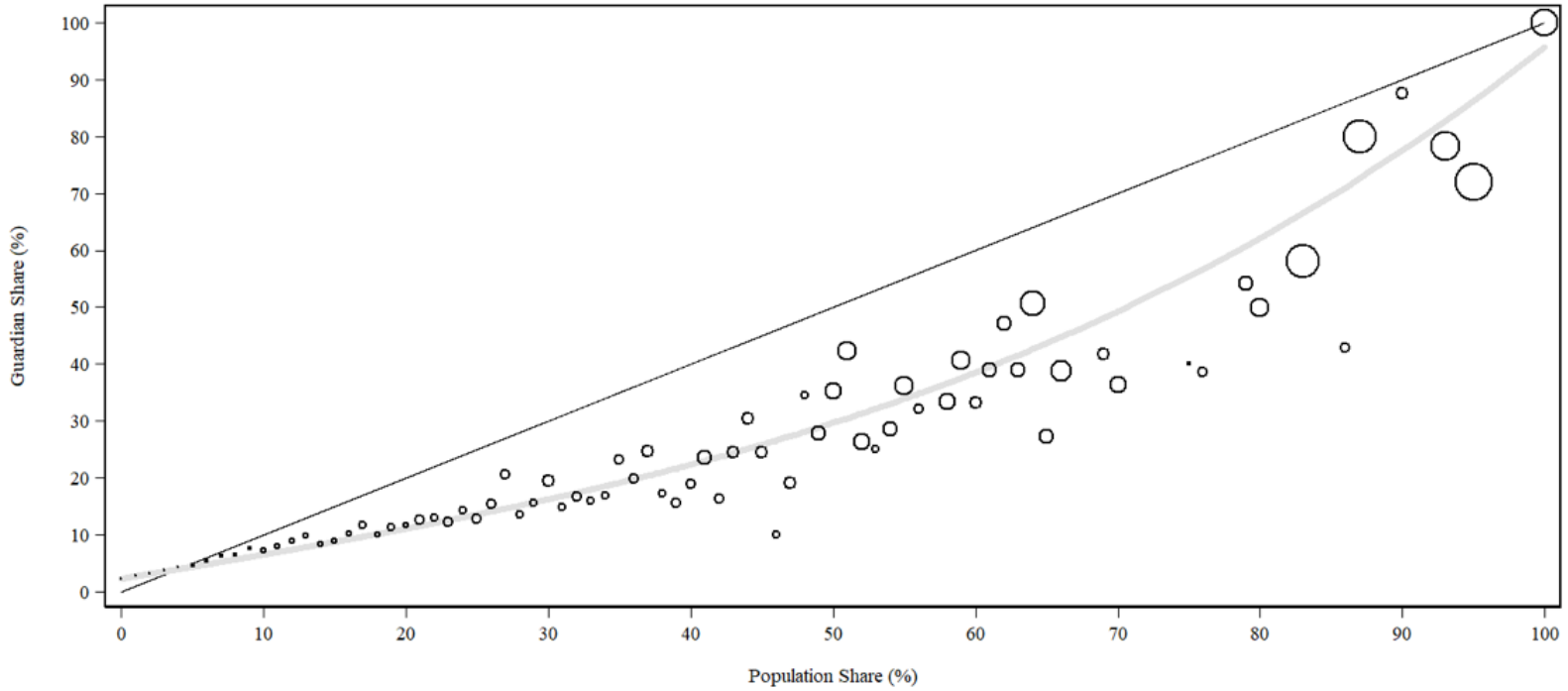
Notes: Each dot pictured above represents an English parish. The x-axis measures each parish's share of population of the Poor Law union to which it belonged in 1881. The y-axis measures each parish's share of the guardianship of the Poor Law union to which it belonged. The positive or negative vertical distance between each dot and the 45-degree line represents the extent to which each parish is over- or under-represented on its union's board of guardians (with respect to its population).

Figure 3.6: Guardian-Share by Binned Population-Share



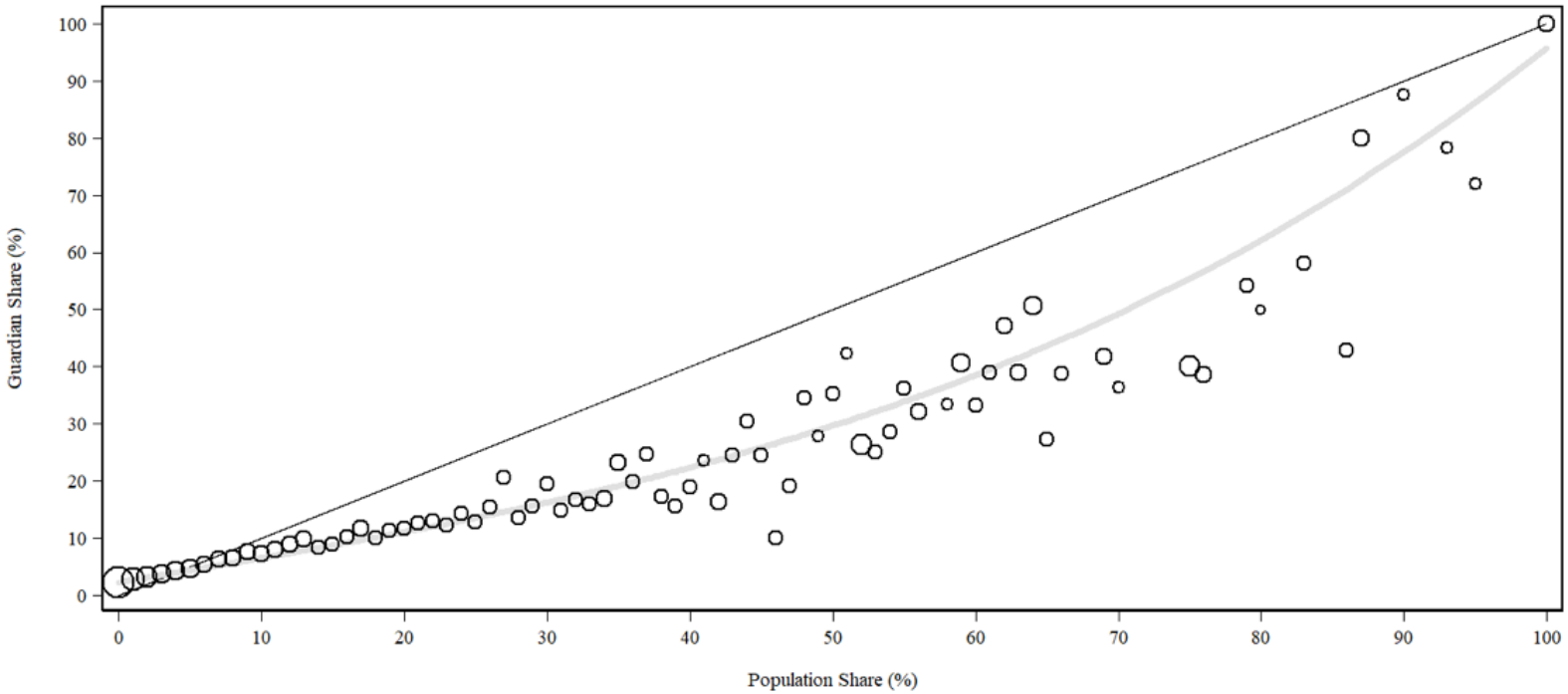
Notes: Each dot pictured above represents the average guardian-share among the parishes in a particular population-share bin, of which there are 100, evenly-spaced, with a bandwidth of 1 percentage-point. Also pictured is a 2nd-degree polynomial of best fit. That these dots deviate only minimally from this polynomial at population-shares below 25 percent, where more than 99 percent of all parishes lie, suggests a strong systematic relationship between population-share and guardian-share. That this line lies above the 45-degree line at small population-shares (i.e., below 5 percent) and below the 45-degree line at greater-than-small population-shares (i.e., above 5 percent) suggests that parishes with small population-shares tended to be over-represented on their unions' boards of guardians and parishes with greater-than-small population-shares were under-represented on their unions' boards of guardians.

Figure 3.7: Guardian-Share by Binned Population-Share (Pop. Weighted)



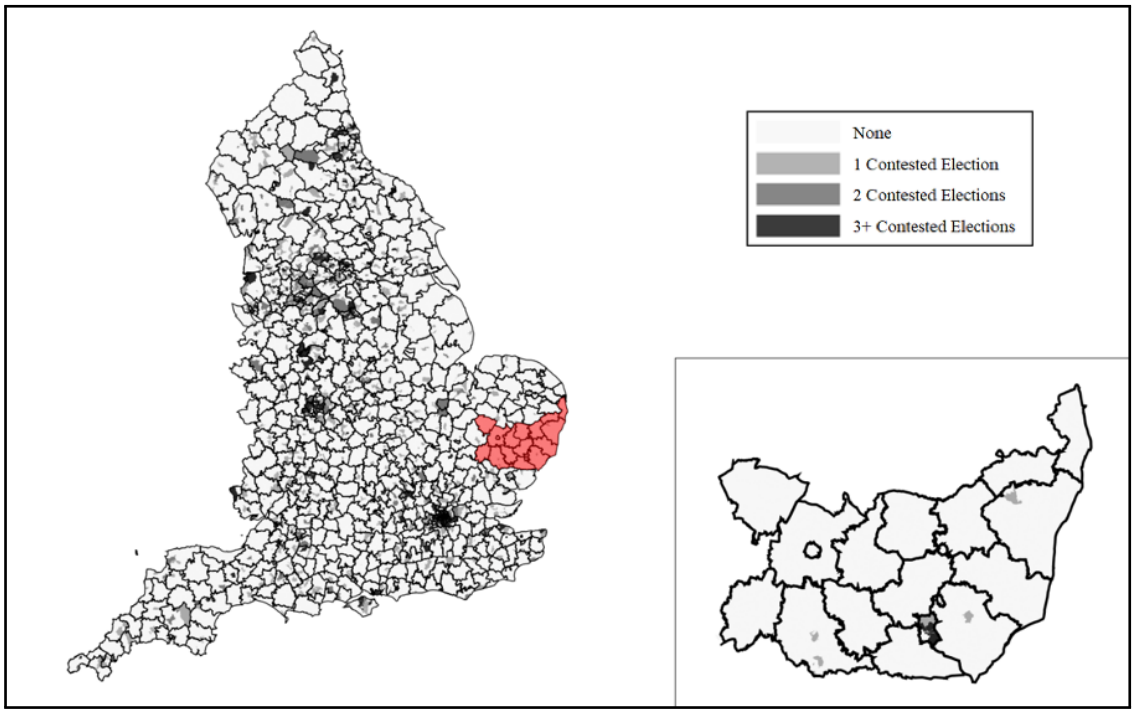
Notes: Each circle pictured above represents the average guardian-share among the parishes in a particular population-share bin, of which there are 100, evenly-spaced, with a bandwidth of 1 percentage point. The size of each circle is proportional to the average population among the parishes in the corresponding bin. Also pictured is a 2^{nd}-degree polynomial of best fit. Note that the smallest circles tend to lie above (or, if below, closer to) the 45-degree line. This suggests that parishes with the smallest populations tended to be the most over-represented on their unions' boards of guardians. The average population of parishes represented by one guardian was 511 persons, but 657 parishes with less than 50 persons were also represented by one guardian.

Figure 3.8: Guardian-Share by Binned Population-Share (RV per Capita Weighted)



Notes: Each circle pictured above represents the average guardian-share among the parishes in a particular population-share bin, of which there are 100, evenly-spaced, with a bandwidth of 1 percentage point. The size of each circle is proportional to the average rateable value per capita among the parishes in the corresponding bin. Also pictured is a 2nd-degree polynomial of best fit. Note that the largest circles are concentrated above the 45-degree line. This suggests that the wealthiest parishes tended to be the most over-represented on their unions' boards of guardians.

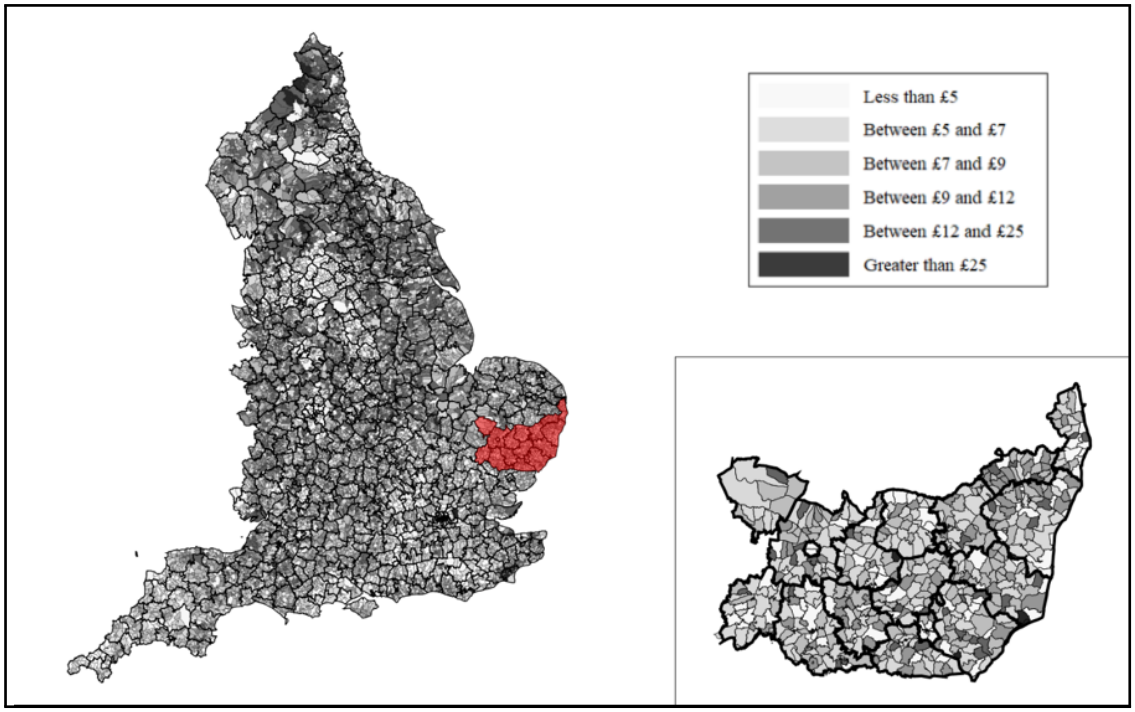
Figure 3.9: Guardian Elections (1873-75)



Source: *Contested Election of Guardians* (1876), *Great Britain Historical GIS Project* (2011).

Notes: Pictured above are the boundaries of every Poor Law union in England and every contested guardian election in England between 1873 and 1875. Since guardian elections were held at the parish level, parishes are shaded. Darker shading implies a greater number of contested elections. Parish boundaries are not otherwise pictured. Note that it was only possible to have multiple elections per year (and, hence, more than three elections between 1873 and 1875) in parishes that were subdivided into wards. The inset depicts and magnifies the county of Suffolk (also pictured in red in the main panel).

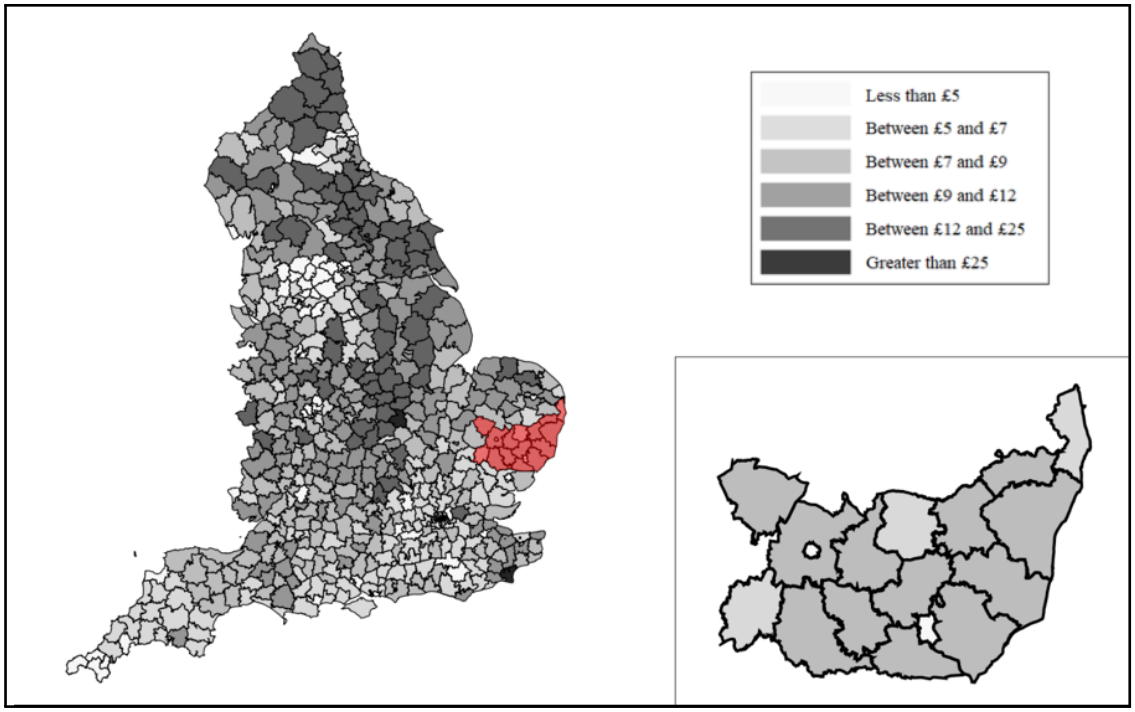
Figure 3.10: Rateable Value per Capita (by Parish)



Source: *Poor Rate Valuation* (1882), *Great Britain Historical GIS Project* (2011).

Notes: Pictured above is the rateable value per capita (i.e., property wealth) of each parish in England in 1881, of which there were 13,869. Darker shading implies more property wealth per capita. The inset depicts and magnifies the county of Suffolk (also pictured in red in the main panel).

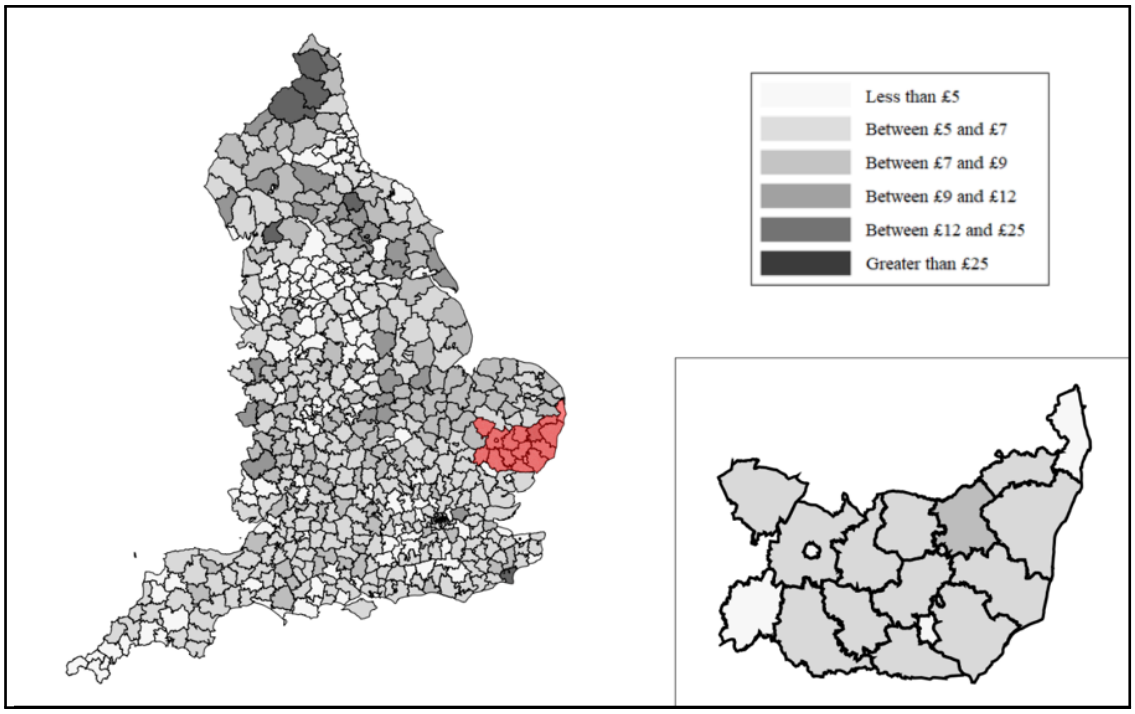
Figure 3.11: Effective Rateable Value per Capita (by Union)



Source: *Poor Rate Valuation* (1882), *Great Britain Historical GIS Project* (2011).

Notes: Pictured above is the "effective" rateable value per capita (i.e., property wealth) of each union in England in 1881, of which there were more than 600. I define "effective" rateable value per capita as the weighted average of a union's parishes' rateable value per capita, with weights proportional to each parish's representation on its union's board of guardians. Darker shading implies more "effective" property wealth per capita. The inset depicts and magnifies the county of Suffolk (also pictured in red in the main panel).

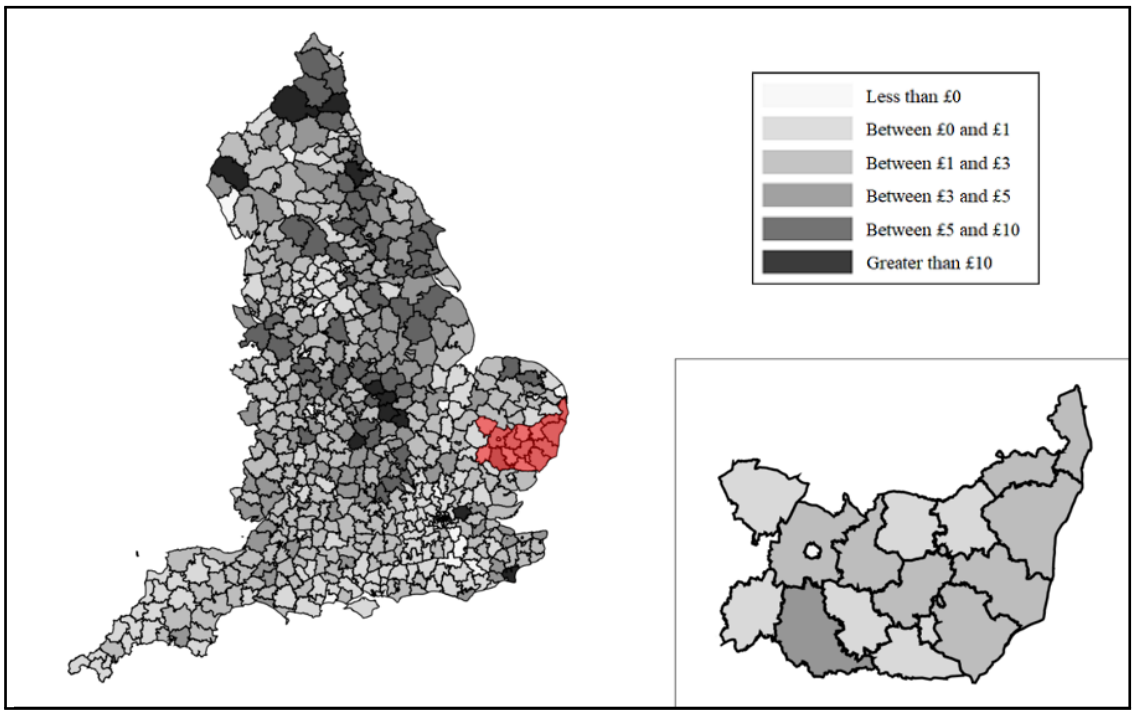
Figure 3.12: Actual Rateable Value per Capita (by Union)



Source: *Poor Rate Valuation* (1882), *Great Britain Historical GIS Project* (2011).

Notes: Pictured above is the "actual" rateable value per capita (i.e., property wealth) of each union in England in 1881, of which there were more than 600. I define "actual" rateable value per capita as a union's total rateable value divided by its total population. Darker shading implies more "actual" rateable value per capita. The inset depicts and magnifies the county of Suffolk (also pictured in red in the main panel).

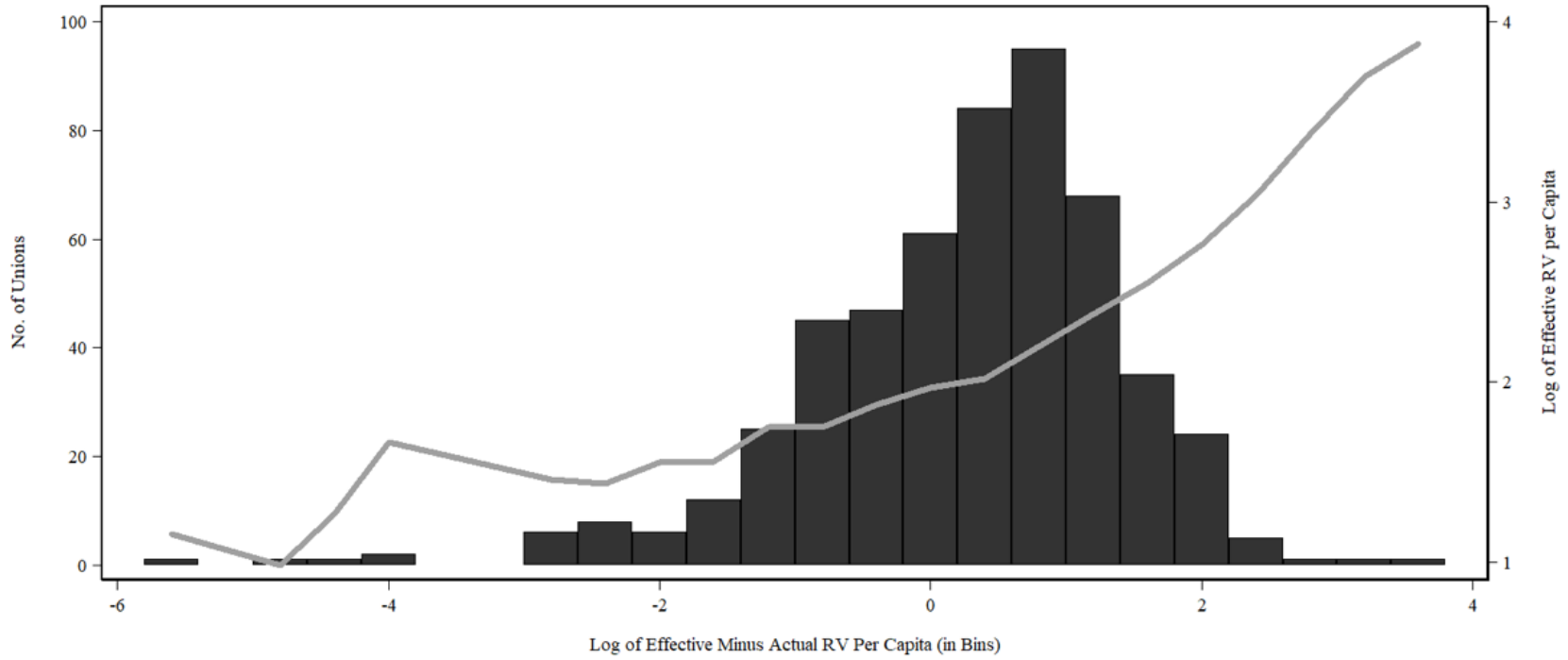
Figure 3.13: Diff. b/w Effective and Actual RV per Capita (by Union)



Source: *Poor Rate Valuation* (1882), *Great Britain Historical GIS Project* (2011).

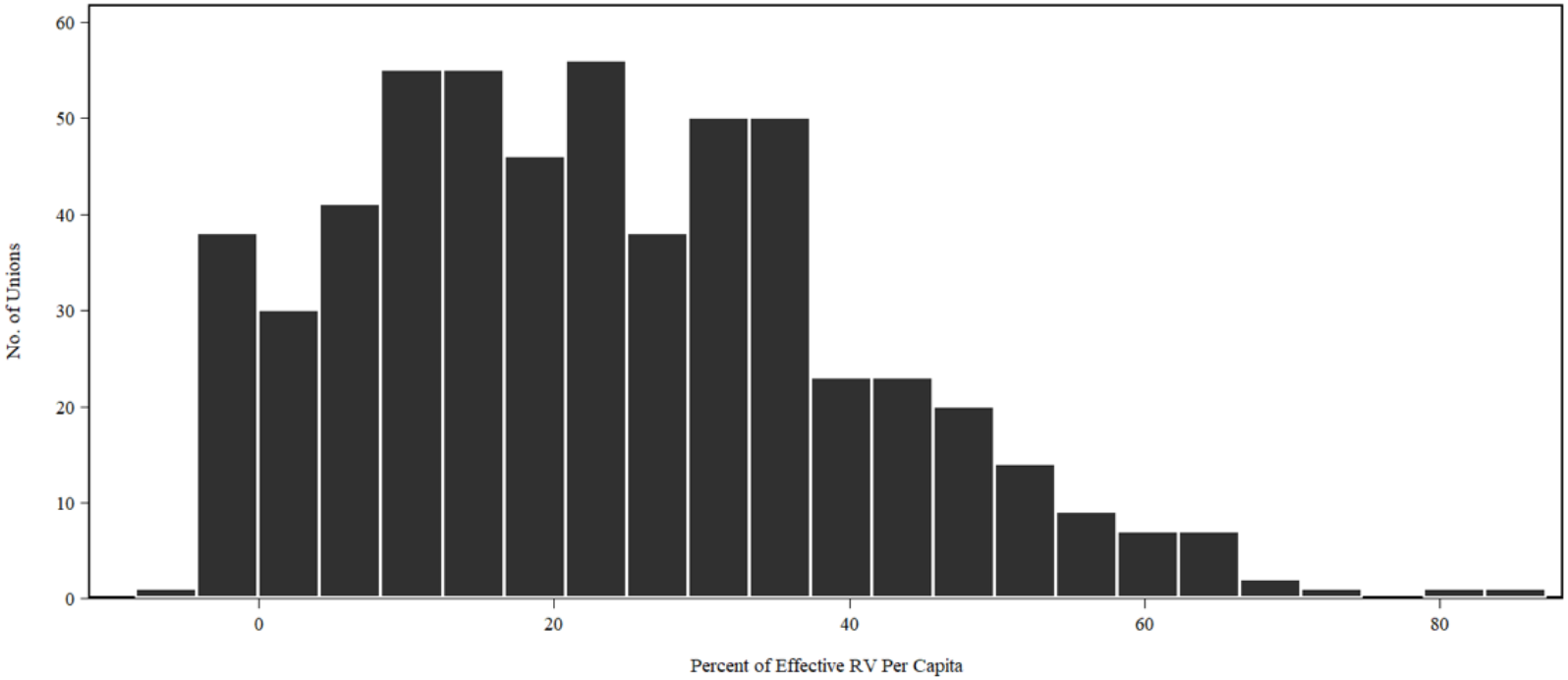
Notes: Pictured above is the difference between the "effective" and "actual" rateable value per capita (i.e., property wealth) of each union in England in 1881, of which there were more than 600. I define "effective" rateable value per capita as the weighted average of a union's parishes' rateable value per capita, with weights proportional to each parish's representation on its union's board of guardians. I define "actual" rateable value per capita as a union's total rateable value divided by its total population. Darker shading implies a larger difference between "effective" and "actual" property wealth per capita. The inset depicts and magnifies the county of Suffolk (also pictured in red in the main panel).

Figure 3.14: Histogram of DIFFERENCE (with EFFECTIVE)



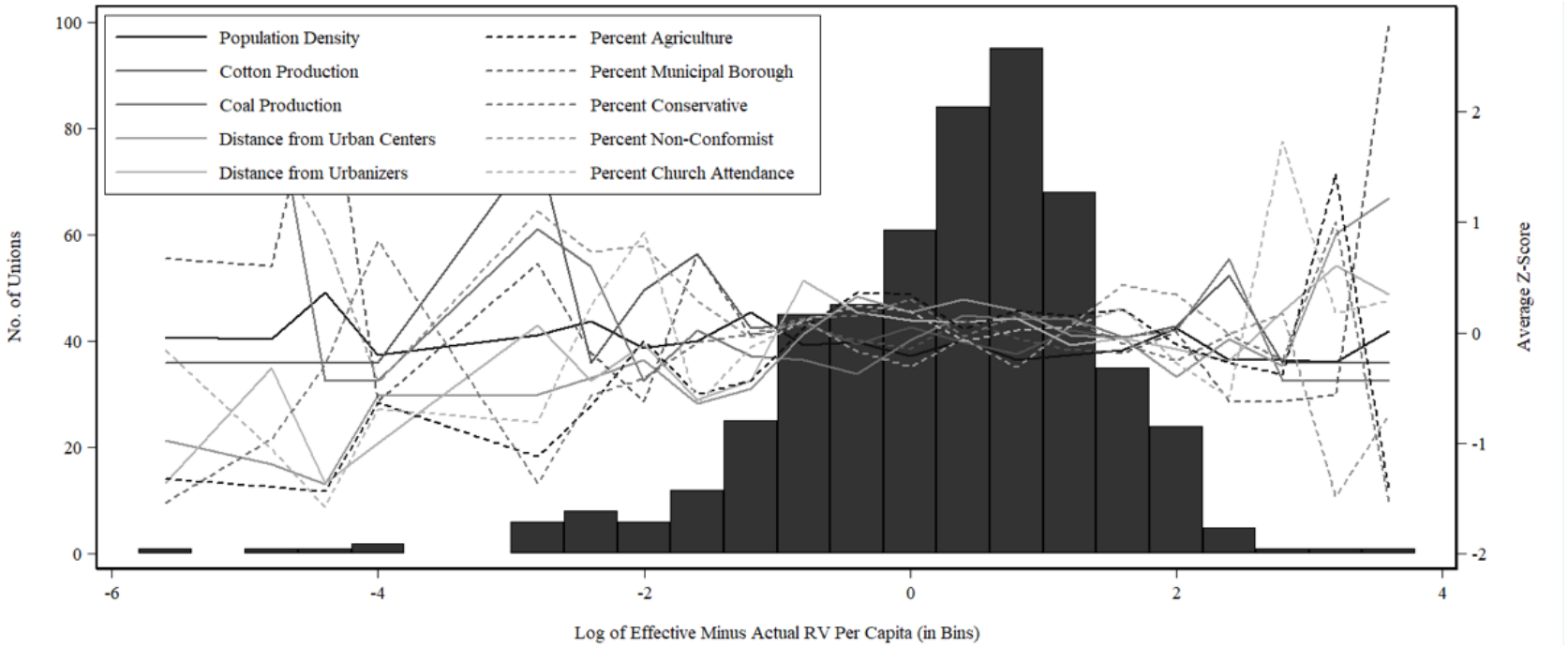
Notes: The histogram above plots the log of the difference between "effective" rateable value per capita and "actual" rateable value per capita. This is (the log of) my instrumental variable. The grey line plots average "effective" wealth within each bin. This is my treatment variable. The strong association between my instrumental variable and my treatment variable is, I claim, prima facie evidence of a strong first stage.

Figure 3.15: Histogram of Share of DIFFERENCE



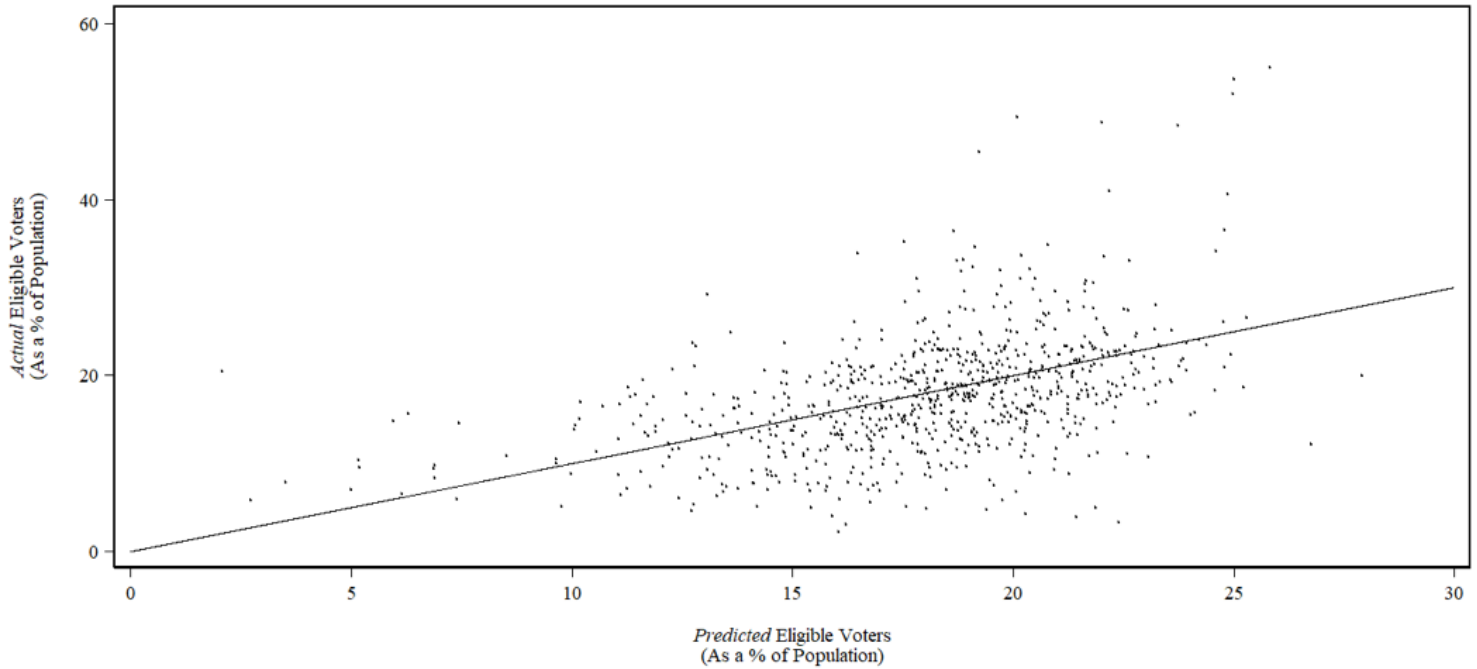
Notes: In this essay I disaggregate "effective" ratable value per capita into its two component parts: (1) "actual" rateable value per capita and (2) the difference between "effective" and "actual" rateable value per capita. The histogram above plots the latter component's share. Note that this share is negative when "actual" rateable value per capita exceeds "effective" rateable value per capita.

Figure 3.16: Histogram of DIFFERENCE (with Covariates)



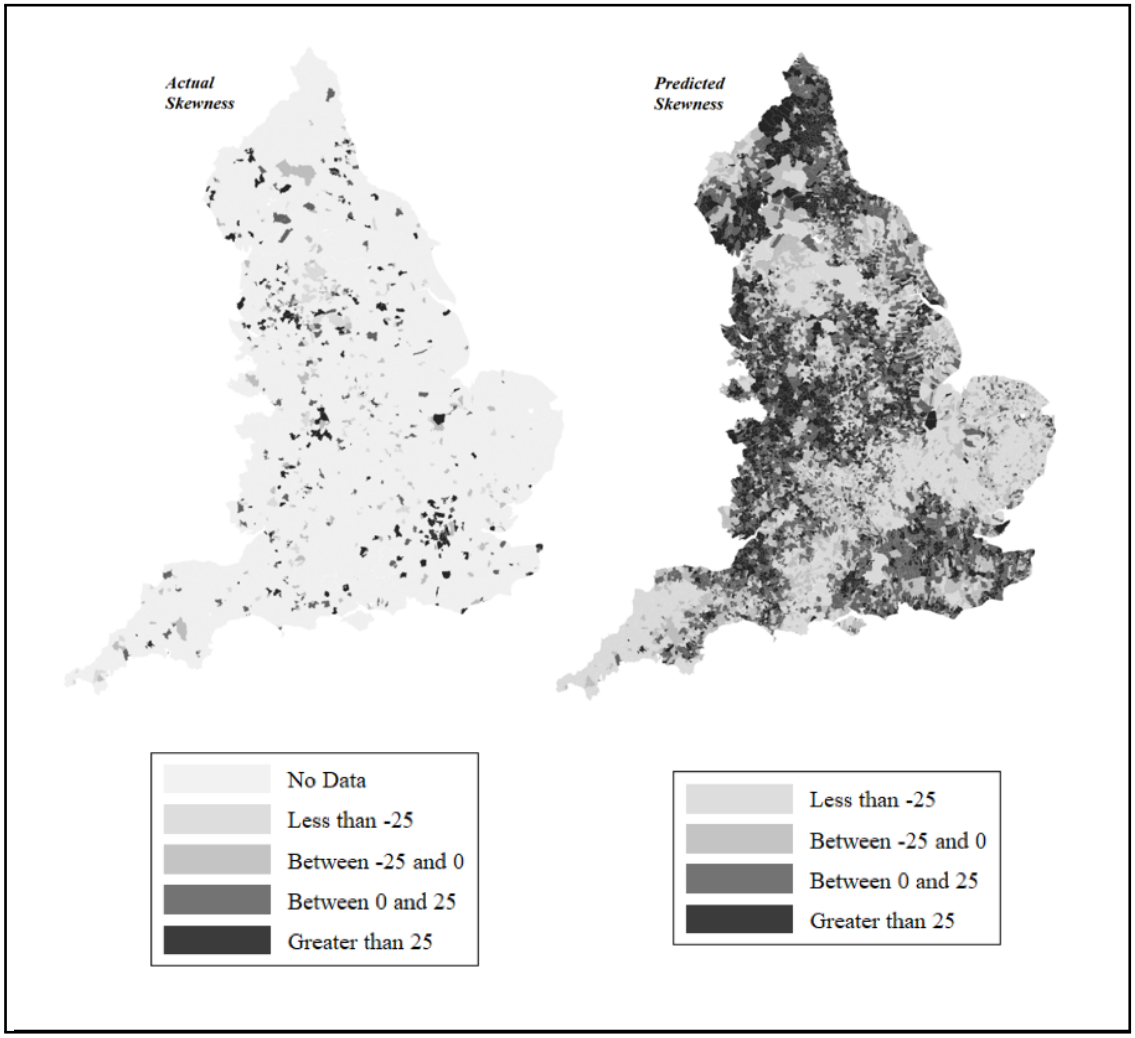
Notes: This histogram plots the log of the difference between "effective" rateable value per capita and "actual" rateable value per capita. This is (the log of) my instrumental variable. The variously-shaded solid and dashed lines plot the averages of a variety of union-level covariates (each of which is standardized into z-scores) within each bin. The lack of any association between my instrumental variable and these covariates—the "flatness" of the variously-shaded solid and dashed lines—is, I claim, prima facie evidence of the validity of the exclusion restriction.

Figure 3.17: Actual vs. Predicted Voting Eligibility



Notes: Each dot pictured above represents an English parish that held at least one guardian election between 1873 and 1875. The y-axis measures the *actual* number of eligible voters in these elections (as a percent of population). The x-axis measures the *predicted* number of eligible voters in these elections (as a percent of population) according to the results of Equation 3.7. Also pictured is the 45-degree line.

Figure 3.18: Wealth Skewness



Notes: Pictured above is wealth skewness (as defined in Equation 3.6) by parish. The leftmost panel plots *actual* wealth skewness for parishes that held at least one guardian election between 1873 and 1875. Only in these parishes do I observe guardian election data and, therefore, only in these parishes can I calculate wealth skewness directly. The rightmost panel includes *predicted* wealth skewness for all other English parishes. See Section 3.4 for calculations.

APPENDIX A

DATA APPENDIX FOR *THE MORTALITY EFFECTS OF LOCAL BOARDS OF HEALTH IN ENGLAND, 1848-70*

The dataset that I construct consists of 576 English poor law unions between 1848 and 1870. In this section I demonstrate in greater detail the method by which each variable is constructed, the source or sources from which each variable derives, and the procedure by which these sources are transcribed and combined. I refer to primary sources by the abbreviations enumerated below.

A.1 Primary Sources

Abbr.	*Source Title*	*Year(s)*	*Source Citation†*
RRG	Annual Reports of the Registrar-General	1849-72	
DCR	Decennial Census Reports	1841-71	
RHS	Annual Reports of the Home Secretary	1858-70	
RLB1	Return of Boards Acting Under the PHA	1868	PP, 58 (1867-68), pp. 789-823
RLB2	Return of No. & Names of Local Boards	1870	PP, 55 (1870), pp. 711-752
RLB3	Return of Districts where PHA is in Force	1867	PP, 59 (1867), pp. 141-167
RLB4	Return of Local Boards of Health	1857	PP, 41 (1857), pp. 3-23
RSC	Religious Supplement to the 1851 Census	1853	PP, 89 (1852-53), pp. 279-422
RV1	Return of Gross Estimated Property Rental	1861	PP, 54 (1861), pp. 141-167
RV2	Return of Rateable Value	1869	PP, 53 (1868-69), pp. 33-58
PLB	4^{th} Annual Report of the Poor Law Board	1851	PP, 23 (1852), pp. 43-74
GHC	Guide to the House of Commons	1857	[7]

† PP refers to the House of Commons Parliamentary Papers.

A.2 Variables

Mortality Rate, or DR_{ut}, is defined as the number of deaths per 1,000 population (i.e., the "crude" mortality rate) in union u and year t. I obtain the total deaths in each union in each year between 1848 and 1870 from RRG and the total population in each union in 1841, 1851, 1861, and 1871 from DCR. I (linearly) interpolate union population between census years.

Local Board Share, or $BFRAC_{ut}$, is defined as the share of the total population of union u in year t that fell under the jurisdiction of a local board of health. Since the boundaries of local boards of health, of which more than 600 were adopted between 1848 and 1870, did not match the boundaries of poor law unions, it is necessary to determine the unions with which each local board of health intersected and the extent of each intersection. I obtain the names of the constituent parishes of poor law unions from DCR, the names and 1861 populations of the constituent parishes or parts of parishes of all local boards of health adopted between 1848 and 1866 from RLB1, and the names and 1861 populations of the constituent parishes or parts of parishes of all local boards of health adopted between 1867 and 1870 from RLB2. I also obtain the adoption years of all local boards of health adopted between 1848 and 1866 from RLB3. I do not observe the exact adoption years of local boards of health adopted between 1867 and 1870, and therefore I exclude all 20 unions within which at least one local board of health was adopted between 1867 and 1870. For all remaining unions, I define POP_u as the population of union u in 1861, POP_{uh} as the 1861 population of the constituent parishes or parts of parishes of local board of health h that fell under the jurisdiction of union u, and AY_h as the year in which local board of health h was adopted. I calculate the proportion of union u's population that fell

under the jurisdiction of a local board of health in year t in the following way:

$$\text{BRAC}_{ut} = \sum_{h} \left(\frac{\mathbf{1}(\text{AY}_h \geq t) \times \text{POP}_{uh}}{\text{POP}_u} \right) \tag{A.1}$$

Population Density is defined as the population per area (in acres) in union u in year t. I obtain the total acreage in each union from DCR. Union population is obtained as before.

Percent in Agriculture is defined as the percent of persons aged twenty and upwards (i.e., "adults") that were employed in agriculture in union u and year t. I obtain these data for 1841, 1851, and 1861 from DCR. I obtain these data for 1881 from a machine-readable version of the 1881 Census Enumerators' Books made available by the UK Data Archive via the Vision of Britain website. I (linearly) interpolate these data between census years.

Coal Production Dummy is defined as whether or not coal production was "a special occupation pursued" within union u in 1851. These data are obtained from DCR.

Cotton-Textile Production Dummy is defined as whether or not cotton-textile production was "a special occupation pursued" within union u in 1851. These data are obtained from DCR.

Fraction Water is defined as the proportion of union u's total area (in acres) that consisted of water (i.e., harbors, creeks, rivers, etc.) in 1851. I obtain both the total acreage and the total water-acreage in each union in 1851 from DCR. In the case of unions bordering on the sea coast, "a certain proportion of the beach or sands" was included as water-acreage.

Rateable Value per Capita is defined as the amount of owned or occupied property that is rated to the relief of the poor (i.e., assessed for local taxation) per population in union u and year t. This is tantamount to property wealth per population. I obtain rateable value in 1856 and 1868 from RV1 and RV2, respectively. I (linearly) interpolate these data between 1856 and 1868 and (linearly) extrapolate these data between 1848 and 1856 and between 1868 and 1870. Union population is obtained as before.

Poor Law Expenditure per Capita is defined as the amount expended per population by the board of guardians representing union u in 1851. Expenses included cash or in-kind welfare benefits (i.e., outdoor relief), the provision of room and/or board in a workhouse (i.e., indoor relief), and any fees and salaries associated with the maintenance of workhouses, the cost of all of which was passed along to union ratepayers (i.e., taxpayers) in the form of a so-called "poor rate." I obtain total expenditure in each union from PLB. Union population is obtained as before.

Church Attendance is defined as the proportion of union u's population that attended a church service of any denomination on the 30th of March, 1851. I obtain total church attendance in each union from RSC. Union population is obtained as before. Although a day-count may over- or under-state average church attendance, Eli & Slater (1994) demonstrate that there is little evidence of any widespread falsification or manipulation of church attendance data by religious actors on behalf of their denominations in order to buoy attendance numbers, lest their denominations be cast in poor light [35].

Fraction Non-Conformist is defined as the proportion of religious sittings in union u in 1851 that were classified as non-Anglican Protestant (e.g., Presbytar-

ian, Baptist, Unitarian, Wesleyan Methodist, etc). I obtain the number of Anglican, non-Anglican Protestant, Roman Catholic, and total sittings in each union in 1851 from Table H of RSC. I then divide non-Anglican Protestant sittings by total sittings.

Fraction Conservative is defined as the proportion of union u's political representatives (i.e., MPs) that were affiliated with a conservative political party in 1852, after that year's general election. I obtain the party affiliation of all 496 English members of Parliament—broadly defined as liberal, conservative, or liberal-conservative (i.e., Peelite)—from GHC. Since the distinction between conservative and Peelite was a matter of international trade (and, hence, irrelevant in terms of public health), I re-classify all liberal-conservatives as conservatives. As with the boundaries of local boards of health, the boundaries of parliamentary constituencies, of which there were 282 in England and Wales in 1851, did not match the boundaries of poor law unions. It is therefore necessary to determine the unions with which each constituency intersected and the extent of each intersection. I obtain the names and populations of the constituent parishes of every parliamentary constituency in 1851 from DCR and match these parishes to unions. I then define POP_u as the population of union u in 1851, POP_{uc} as the population of parliamentary constituency c that fell under the jurisdiction of union u in 1851, MPS_c as the number of members of Parliament representing constituency c in 1852, and CON_{cm} as a dummy that takes a value of 1 if member m of constituency c was affiliated with a conservative political party in 1852. I calculate the proportion of union u's political representatives that were affiliated with a conservative political party in the following way:

$$\text{CFRAC}_u = \sum_c \left(\frac{\text{POP}_{uc}}{\text{POP}_u} \left(\sum_m \frac{\text{CON}_{cm}}{\text{MPS}_c} \right) \right) \tag{A.2}$$

The inner sum represents the proportion of the members of Parliament representing constituency c that were conservative. The outer sum weights each constituency c by the proportion of the population of each union u that it contained.

Fraction Municipal Borough is defined as the proportion of union u's population that fell under the jurisdiction of a municipal borough. As with the boundaries of local boards of health and of parliamentary constituencies, the boundaries of municipal boroughs, of which there were 176 in England in 1851, did not match the boundaries of Poor Law unions. It is, therefore, necessary to determine the Poor Law unions with which each municipal borough intersected and the extent of each intersection. I obtain the names and 1851 populations of the constituent parishes of every municipal borough in 1851 from DCR and match these parishes to Poor Law unions. I then define POP_u as the population of union u in 1851 and POP_{ub} as the population of municipal borough b that fell under the jurisdiction of union u in 1851. I calculate the proportion of union u's population that fell under the jurisdiction of a municipal borough in the following way:

$$\text{MFRAC}_u = \sum_b \left(\frac{\text{POP}_{ub}}{\text{POP}_u} \right) \tag{A.3}$$

Census Division Dummies are regional indicators that I employ as fixed effects. DCR defines ten regions of England that do not change between 1841 and 1871. Table A.1 enumerates the counties or parts of counties of which each census division was comprised.

Board Borrowing, as shown in Table 1.5, refers only to the amount that Local Boards of Health borrowed from the Exchequer. It, therefore, excludes all borrowing from private sources and all expenditures that were not borrowed. I obtain total borrowing by local boards of health from the Exchequer between 1848 and 1857 from RLB4 and annual borrowing by local boards of health from the Exchequer between 1858 and 1870 from RHS.

A.3 Changes in Union Boundaries

There were a small number of boundary changes among unions between 1848 and 1870, each of which took either one or the other of two forms. First, some unions were dissolved and incorporated into other unions. In 1869, for example, the two parishes that comprised the Brinton Union in the county of Norfolk joined the Walsingham Union. In these cases, I agglomerate the dissolved union (e.g., Brinton) and the union or unions into which it was incorporated (e.g., Walsingham) in all years prior to the boundary change. Second, some unions were divided into multiple unions. In 1861, for example, nine parishes were withdrawn from the Wirral Union in the county of Cheshire to form the Birkenhead Union. In these cases, I agglomerate the parent union (e.g., Wirral) and the union or unions into which it was divided (e.g., Birkenhead) in all years after the boundary change.

A.4 Supplementary Tables

Table A.1: Census Divisions

CD #	CD Name	Counties
I	Metropolis	Kent†, Middlesex†, Surrey†
II	S. Eastern	Berkshire, Kent†, Southampton, Surrey†, Sussex
III	S. Midland	Beds., Bucks, Cambs., Herts., Hunts., Middlesex†, Northants., Oxon.
IV	Eastern	Essex, Norfolk, Suffolk
V	S. Western	Cornwall, Devon, Dorset, Somerset, Wiltshire
VI	W. Midland	Gloucs., Heref., Mon.††, Shrops., Staffs., Warks., Worcs.
VII	N. Midland	Derby, Leicester, Lincoln, Nottingham, Rutland
VIII	N. Western	Chester, Lancaster
IX	York	East Riding, North Riding, West Riding
X	Northern	Cumberland, Durham, Northumberland, Westmorland
XI	Wales	Excluded from Dataset

† Indicates that only part of county is included in the corresponding census division.

†† The classification of Monmouth is inconsistent across sources. Some, including DCR, classify Monmouth as a part of Census Division XI (i.e., Wales). Others classify Monmouth as a part of Census Division VI (i.e., West Midlands). I use the latter classification.

APPENDIX B

DATA APPENDIX FOR *HARDLY WORTH CHAINING UP? THE EFFECT AND COST-EFFECTIVENESS OF WELFARE REFORM IN ENGLAND, 1857-85*

The dataset that I construct consists of 576 English Poor Law unions. In this section I demonstrate in greater detail the method by which each variable is constructed, the source or sources from which each variable derives, and the procedure by which these sources are transcribed and combined. I refer to primary sources by the abbreviations enumerated below.

B.1 Primary Sources

Abbr.	*Source Title*	*Year(s)*	*Source Citation†*
DCR	Decennial Census Reports	1851-91	
RWA	Return of Workhouse Accommodation	1855	PP, 46 (1854-55), pp. 13-36
RRP	Return of the Rate in the Pound	1861	PP, 54 (1861), pp. 1-274
RPLI	Return of Poor Law Inspectors	1868	PP, 61 (1867-68), pp. 171-864
WHD1	Poor Law (Workhouse Dietaries)	1864	PP, 52 (1864), pp. 695-723
WHD2	Dietaries of the Inmates of Workhouses	1866	PP, 35 (1866), pp. 321-627
WHD3	Workhouse Dietaries	1867	PP, 60 (1867), pp. 87-89
RMO	Report of Med. Officer of Privy Council	1864	PP, 28 (1864), pp. 1-793
PRP	Poor Rates and Pauperism	1857-85††	See Section B.4
LGD	Knight's Local Government Directory	1881, 86	[9, 11]
GBGIS	Great Britain Historical GIS Project	2011	[93]

† PP refers to the House of Commons Parliamentary Papers.

†† Years included are 1857, 1860-66, 1868, 1870, 1872, 1874, 1876, 1878, 1880, 1885.

B.2 Variables

Local Government Areas. Victorian England was subdivided into geographically nested administrative and/or statistical areas. From smallest to largest, these areas were (*i*) the *civil parish*, (*ii*) the *Poor Law union*, (*iii*) the *registration county*, and (*iv*) the *census division*. My dataset consists of 13,869 civil parishes, 576 Poor Law unions, 42 registration counties, and 10 census divisions. The average population of each of these areas in 1881 was 1,813, 41,793, 588,081, and 2,418,899, respectively. I match each English Poor Law union to the registration county and census division to which it belonged, and to the civil parishes of which it was composed, using DCR. I also obtain the GIS identifiers of each English Poor Law union from GBGIS. This enables me to plot variables geographically. Table B.1 enumerates all 10 English census divisions and the registration counties or parts of registration counties of which they were composed.

Population & Area. I obtain the population and the area (in acres) of each English Poor Law union in 1851, 1861, 1871, 1881, and 1891 from DCR. These data yield the population density of each English Poor Law union. The average population density of English Poor Law unions in 1851, 1861, 1871, 1881, and 1891 was 6.03, 6.59, 7.25, 7.52, and 7.71 persons per acre, respectively. I (linearly) interpolate these data between census years.

Percent in Manufacturing/Industry. I obtain the proportion of the adult population in each English Poor Law union that worked in "manufactures" in 1851 and that worked in "industry" in 1861 from PRP. Note that this classification change (from the more narrowly defined "manufacturing" to the less narrowly defined "industry") precludes the use of these data in a panel. Table B.2 enumer-

ates the occupational classes and/or sub-classes included in these definitions and the number and percent of persons working in each of them (according to DCR).

Percent in Agriculture. I obtain the proportion of the adult population in each English Poor Law union in 1851 and 1861 that worked in "agricultural production" from DCR.[1] I obtain the proportion of the adult population in each English Poor Law union that worked in "agricultural production" in 1881 from GBGIS. The 1881 occupational data is based on data provided through www.VisionofBritain.org.uk and uses statistical material which is copyright of the Great Britain Historical GIS Project, Humphrey Southall and the University of Portsmouth. I (linearly) interpolate these data between census years.

Coal & Cotton-Textile Production. I obtain indicators for whether coal production or cotton-textile production were "special occupations pursued" in each English Poor Law union in 1851 from DCR, according to which roughly 15 percent of unions specialized in coal and roughly 7 percent of unions specialized in cotton-textiles. Coal unions (of which there were 89) were disproportionately concentrated in the West Midlands and in the North of England (i.e., Census Divisions VI and X) and cotton-textile unions (of which there were 39) were disproportionately concentrated in North Western England (i.e., Census Division VIII).

[1]Hunt (1973) notes that "several minor occupations moved in and out of the 'agricultural' classification from one census to the next," and that "though it is impossible to say how much this affects the accuracy of the [occupational census data], the accuracy of the census probably improved over time." He also notes that "other errors occurred at first source due to ignorance or what the Registrar General in 1891 termed, 'the foolish but very common desire of persons to magnify the importance of their occupational condition.' [The Registrar General] was skeptical, for example, about the high proportion of hawkers and costermongers who returned themselves as employers of labour and drew attention also to lads and girls who were actually engaged in the manufacture of false teeth but who returned themselves as dentists" [55].

Wages of Agricultural Laborers. I obtain county-level estimates of the average weekly wage paid to agricultural laborers in the years 1850, 1861, 1867-70, and 1880 from [23]. These estimates should adequately proxy the circumstances of unskilled laborers. Note that all English Poor Law unions in the same registration county have, by construction, identical agricultural wage estimates. I (linearly) interpolate these data between the given years.

Indoor & Outdoor Paupers. I obtain the number of paupers that received indoor relief and the number of paupers that received outdoor relief in each English Poor Law union on July 1st of 1857, 1860-66, 1868, 1870, 1872, 1874, 1876, 1878, 1880, and 1885 from PRP. I also obtain the proportion of paupers of each type (i.e., indoor, outdoor) that belonged to each sex (i.e., male, female, child) and each class (i.e., able-bodied, non-able-bodied, "lunatics, insane persons, and idiots") in each Poor Law union on July 1st of 1857, 1865, 1880, and 1885 from PRP.

Poor Rates. I obtain the poor rate levied in each English civil parish in 1856 from RRP. Poor rates were determined by (*i*) *expenditures* and (*ii*) *rateable value*. The Clophill Parish in the Ampthill Union in Bedford, for example, spent £340 for the relief of the poor, possessed £2,893 in rateable value, and levied a poor rate of 2 shillings and 4.25 pence per pound. Since each pound was equivalent to 20 shillings and each shilling was equivalent to 12 pence, the effective tax rate in the Clophill Parish was 11.75 percent.

Workhouse Capacity. I obtain the capacity (i.e., the "accommodation") of the workhouses in each English Poor Law union in 1854 from RWA and in 1880 and 1885 from LGD, and the capacity of the workhouses in 467 English Poor Law unions in 1867 from RPLI. Workhouse capacities were determined according

to the cubic footage of the wards therein. According to Webb & Webb (1910), ”ordinary wards were to be at least ten feet high and eighteen feet wide,” with a minimum of ”300 cubic feet required for each healthy person in a dormitory” [112, p. 135]. These dimensions, however, were neither mandated nor enforced. They were a rule-of-thumb. The workhouses in 58 Poor Law unions (almost half of which were in Metropolitan London) had more inmates on July 1st, 1880 than official capacity.

Sanitary Condition of Workhouses. I obtain the sanitary condition of the workhouses in a subset of English Poor Law unions from RPLI, which reports whether the ventilation was deficient in 324 workhouses, whether the water supply was deficient in 324 workhouses, and whether the ”general sanitary condition” was deficient in 235 workhouses. This source reproduces the separate responses of seven Poor Law inspectors (each of whom was assigned to inspect a separate district of England) to an October 1866 Circular Letter of the Poor Law Board that requested a report containing, among other things, an assessment of ”the ventilation, light, water supply, and the general sanitary state of the workhouse.” Some inspectors answered simply ”good” or ”bad.” Others provided categorical answers (e.g., very good, fair, inadequate, not good, bad, etc.). Others provided descriptive answers (e.g., ”there is an abundant supply of excellent water”). In order to quantify these disparate types of answers, I regard ”adequate,” ”fair,” ”tolerable,” or any synonym thereof as ”good,” and I regard any mention of inadequacy, insufficiency, or defectiveness as ”bad.” Table B.3 is a facsimile of part of a table in RPLI that enumerates the sanitary condition, as reported by Sir John Walsham (the Poor Law inspector that presided over the ”Eastern District”), of the workhouses in all 13 Poor Law unions in Kent in 1867. Answers that I regard as ”bad” are bolded and italicized.

Diet of Workhouse Inmates. I obtain "daily dietaries" of the able-bodied male inmates of workhouses in 113 Poor Law unions in Berkshire, Buckingham, Dorset, Kent, Middlesex, Oxford, Southampton, Surrey, Sussex, and Wiltshire in 1867 from RPLI; of workhouses in 59 Poor Law unions in Cambridge, Lincoln, Nottingham, and the East, North, and West Ridings of Yorkshire in 1866 from WHD2; and of workhouses in 8 Poor Law unions in Cornwall, Devon, Hertford, Kent, Lancashire, and Norfolk in 1864 from WHD1.[2] These sources enumerate the amount, by weight, of each type of food (e.g., porridge, suet pudding) that was given to able-bodied male workhouse inmates at each meal (e.g., breakfast, dinner, supper) on each day of the week. Table B.4 is a facsimile of part of a table in WHD1 that enumerates the "daily dietaries" of able-bodied male inmates of the workhouse in the City of London Poor Law Union in 1864. I obtain detailed recipes for the "proper preparation" (according to an April 1867 Circular Letter of the Poor Law Board) of each type of food from WHD3.[3] This yields the amount, by weight, of each ingredient in each type of food. I obtain the number of calories and grams of protein, fat, and carbohydrates per unit of each ingredient from [14], and I use this ingredient-specific nutritional information to calculate the average daily nutritional intake (i.e., calories, protein, fat, carbohydrates) of able-bodied male inmates of the workhouses in each of the 180 English Poor Law unions for which I have "daily dietaries." I also obtain

[2]The Poor Law Commission stipulated that the diet fed to workhouse inmates must be "less eligible" than "the ordinary diet of any class of able-bodied laborers living within the same district." An order of the Poor Law Commission (or, later, of the Poor Law Board) was required to authorize or amend the diet fed to workhouse inmates in every Poor Law union. 501 such orders were issued between 1835 and 1848. After 1848, orders were required by the Consolidated General Order (1848) to include "the opinion of the medical officer of the workhouse...under the seal of the Poor Law Board. This process was necessarily attended with considerable delay and some trouble." See Parl. Papers, 30 (1835), p. 171; Parl. Papers, 19 (1842), p. 66; Parl. Papers, 25 (1848), p. 12, 16.

[3]Recipes were probably inexactly followed. Dr. Edward Smith, then Medical Officer of the Poor Law Board and one of ten Poor Law inspectors, wrote in 1866 that there is "diversity in the composition and consequent nutritive values of foods having the same designation in different workhouses." See WHD2, p. 339; WHD3, p. 87.

county-level estimates of the average weekly meat consumption, by weight, of English agricultural laborers in 1863 from RMO. These estimates derive from a study of 407 agricultural laborers in England, Wales, and Scotland undertaken by Dr. John Simon, then Medical Officer of the Privy Council, and they enable a crude but one-to-one comparison of the consumption habits of workhouse inmates with the consumption habits of the working poor in their immediate environs.

B.3 Changes in Union Boundaries

There were a small number of boundary changes among English Poor Law unions between 1857 and 1885, each of which took one of two forms. First, some unions were dissolved and incorporated into other unions. In 1869, for example, the Brinton Union was dissolved and incorporated into the Walsingham Union. In such cases, I agglomerate the dissolved union (e.g., Brinton) and the union or unions into which it was incorporated (e.g., Walsingham) in all years prior to the boundary change. Second, some unions were divided into multiple unions. In 1861, for example, the nine northernmost parishes of the Wirral Union were withdrawn to form the new Birkenhead Union. In such cases, I agglomerate the parent union (e.g., Wirral) and the new union or unions formed therefrom (e.g., Birkenhead) in all years after the boundary change.

B.4 Poor Rates & Pauperism

Poor Rates and Pauperism (1857), "Return (B.)—Paupers Relieved on 1st July 1857." Parl. Papers, 32 (1857, Session 2), pp. 461-520.

Poor Rates and Pauperism (1860), "Return (B.)—Paupers Relieved on 1st July 1860." Parl. Papers, 58 (1860), pp. 121-174.

Poor Rates and Pauperism (1861), "Return (B.)—Paupers Relieved on 1st July 1861." Parl. Papers, 53 (1861), pp. 121-174.

Poor Rates and Pauperism (1862), "Return (B.)—Paupers Relieved on 1st July 1862." Parl. Papers, 48 (1862), pp. 121-174.

Poor Rates and Pauperism (1863), "Return (B.)—Paupers Relieved on 1st July 1863." Parl. Papers, 51 (1863), pp. 121-174.

Poor Rates and Pauperism (1864), "Return (B.)—Paupers Relieved on 1st July 1864." Parl. Papers, 51 (1864), pp. 603-656.

Poor Rates and Pauperism (1865), "Return (B.)—Paupers Relieved on 1st July 1865." Parl. Papers, 48 (1865), pp. 439-492.

Poor Rates and Pauperism (1866), "Return (B.)—Paupers Relieved on 1st July 1866." Parl. Papers, 62 (1866), pp. 265-318.

Poor Rates and Pauperism (1868), "Return (B.)—Paupers Relieved on 1st July 1868." Parl. Papers, 60 (1867-68), pp. 697-750.

Poor Rates and Pauperism (1870), "Return (B.)—Paupers Relieved on 1st July 1870." Parl. Papers, 58 (1870), pp. 395-448.

Poor Rates and Pauperism (1872), "Return (B.)—Paupers Relieved on 1st July 1872." Parl. Papers, 51 (1872), pp. 157-210.

Poor Rates and Pauperism (1874), "Return (B.)—Paupers Relieved on 1st July 1874." Parl. Papers, 56 (1874), pp. 713-766.

Poor Rates and Pauperism (1876), "Return (B.)—Paupers Relieved on 1st July 1876." Parl. Papers, 62 (1876), pp. 507-560.

Poor Rates and Pauperism (1878), "Return (B.)—Paupers Relieved on 1st July 1878." Parl. Papers, 64 (1878), pp. 741-794.

Poor Rates and Pauperism (1880), "Return (B.)—Paupers Relieved on 1st July 1880." Parl. Papers, 61 (1880), pp. 737-790.

Poor Rates and Pauperism (1885), "Return (B.)—Paupers Relieved on 1st July 1885." Parl. Papers, 67 (1884-85), pp. 283-336.

B.5 Supplementary Tables

Table B.1: Census Divisions

CD #	CD Name	Counties
I	Metropolis	Kent†, Middlesex†, Surrey†
II	S. Eastern	Berkshire, Kent†, Southampton, Surrey†, Sussex
III	S. Midland	Beds., Bucks, Cambs., Herts., Hunts., Middlesex†, Northants., Oxon.
IV	Eastern	Essex, Norfolk, Suffolk
V	S. Western	Cornwall, Devon, Dorset, Somerset, Wiltshire
VI	W. Midland	Gloucs., Heref., Mon.††, Shrops., Staffs., Warks., Worcs.
VII	N. Midland	Derby, Leicester, Lincoln, Nottingham, Rutland
VIII	N. Western	Chester, Lancaster
IX	York	East Riding, North Riding, West Riding
X	Northern	Cumberland, Durham, Northumberland, Westmorland
XI	Wales	Excluded from Dataset

† Indicates that only part of county is included in the corresponding census division.

†† The classification of Monmouth is inconsistent across sources. Some, including DCR, classify Monmouth as a part of Census Division XI (i.e., Wales). Others classify Monmouth as a part of Census Division VI (i.e., West Midlands). I use the latter classification.

Table B.2: Manufactures v. Industry

Class†	Description (Sub-Class)	Persons††	% of Pop.††
Panel A. "Manufactures" in 1851[a]			
XII	Animal Substances		
	Wool (6)	294,773	1.406%
	Silk (7)	141,451	0.675%
	Others Included (2, 3, 4, 5)[b]	54,832	0.262%
XIII	Vegetable Substances		
	Flax, Cotton (12)	750,002	3.578%
	Timber, Bark, Wood (4, 5, 6, 7, 8, 9)	141,388	0.675%
	Cane, Rush, Straw (10)	49,900	0.238%
	Others Included (3, 11, 13)[c]	65,993	0.315%
	Total	**1,007,283**	**4.806%**
Panel B. "Industry" in 1861[d]			
X	Art & Mechanic Productions	953,289	4.751%
XI	Textile Fabrics & Dress	2,231,617	11.121%
XII	Food & Drinks	430,220	2.144%
XIII	Animal Substances	56,092	0.280%
XIV	Vegetable Substances	144,184	0.719%
XV	Minerals	1,012,997	5.048%
	Total	**4,828,399**	**24.062%**

† The 1851 Census organized all occupations into 17 classes and 80 sub-classes. The 1861 Census re-organized these occupational categories in three ways. First, classes and sub-classes were renamed "orders" and "sub-orders." Second, one new "order" (viz., Textile Fabrics & Dress) and six new "sub-orders" were created. Third, "orders" were aggregated into six new higher-level occupational categories (viz., Professional, Domestic, Commercial, Agricultural, Industrial, and Indefinite/Non-Productive). These higher-level occupational categories were (confusingly) called "classes."

†† Refers to total population, not adult population.

[a] The 1851 Census provides this information for England and Wales.

[b] Sub-classes 2, 3, 4, and 5 were defined as Grease et al., Skins, Feathers & Quills, and Hair & Fur, respectively.

[c] Sub-classes 3, 11, and 13 were defined as Guns & Resins, Hemp, and Paper, respectively.

[d]The 1861 Census provides this information for Great Britain (i.e., England, Wales, Scotland, and "Islands in the British Seas"). These islands were the Isle of Man, the Island of Jersey, and the Island of Guernsey.

Table B.3: Sanitary Condition of WHs in Kent (1867)

No.	Union	Ventilation	Water	General	Beds, &c.†
1.	Aylesford	Good	Good	Good	Yes
2.	Blean	Good	***Inadequate***	Good	Yes
3.	Bridge	***Bad***	Good	Good	Fairly
4.	Canterbury	Good	Good	Good	Yes
5.	Dartford	Fair	Good	Good	Yes
6.	Eastry	***Not Good***	Good	Good	Yes
7.	Faversham	Good	Good	Good	Yes
8.	Gravesend	Fair	Good	Pretty Good	Yes
9.	Hoo	***Not Good***	Good	Pretty Good	Fairly
10.	Medway	Fair	Good	Good	Yes
11.	Milton	Fair	Good	***Not Good***	Fairly
12.	Sheppey	Fair	Good	Fair	Yes
13.	Thanet	Fair	Good	Fair	Yes

† This column refers to the question: "Are the beds, bedding, furniture, and utensils sufficient and in good order?" I discard these data since few workhouse inspectors gave definitive answers to this question. I retain only data pertaining to the ventilation, water supply, and "general sanitary state" of workhouses.

Table B.4: Daily Dietaries in City of London WH (1864)

	Breakfast			Dinner						Supper		
	Bread	Porridge	Tea	Bread	Meat	Suet Pdg.	Potatoes	Soup	Cheese	Bread	Cheese	Broth
Units	*oz.*	*pt.*	*pt.*	*oz.*	*oz.*	*oz.*	*lb.*	*pt.*	oz.	*oz.*	*oz.*	*pt.*
Monday	7	1½	-	4	-	-	-	1¼	-	6	1½	1
Tuesday	7	1½	-	-	5	-	¾	-	-	6	1½	1
Wednesday	7	1½	-	-	-	14†	-	-	-	6	1½	1
Thursday	7	1½	-	-	5	-	¾	-	-	6	1½	1
Friday	7	1½	-	4	-	-	-	1½	-	6	1½	1
Saturday	7	1½	-	7	-	-	-	-	2	6	1½	1
Sunday	7	1½	-	-	5	-	¾	-	-	6	1½	1

† The "proper preparation" of 16 ounces of suet pudding, according to WHD3, consisted of 7 ounces of flour, 1¼ ounces of suet (i.e., fat from beef or mutton), and 2 ounces of skimmed milk, water, and salt. The suet was to be "cut into moderately small pieces, and distributed evenly throughout the pudding."

APPENDIX C

DATA APPENDIX FOR *WEALTH AND WEALTH REDISTRIBUTION: EVIDENCE FROM ENGLAND, 1881*

The dataset that I construct consists of 576 English Poor Law unions and 13,869 English civil parishes. In this section I demonstrate in greater detail the method by which each variable is constructed, the source or sources from which each variable derives, and the procedure by which these sources are transcribed and combined. I refer to primary sources by the abbreviations enumerated below.

C.1 Primary Sources

Abbr.	*Source Title*	*Year(s)*	*Source Citation*†
CR51	Census Report	1851	
CR81	Census Report	1881	
RWS	Religious Supplement to the 1851 Census	1853	PP, 89 (1852-53), pp. 1-437
PRV	Poor Rate Valuation	1882	PP, 58 (1882), pp. 59-292
CEG	Contested Election of Guardians	1876	PP, 63 (1876), pp. 147-346
LGB	Report of the Local Government Board	1879	PP, 28 (1878-79), pp. 1-660
PRP1	Poor Rates and Pauperism (January)	1881	PP, 78 (1881), pp. 515-568
PRP2	Poor Rates and Pauperism (July)	1881	PP, 78 (1881), pp. 569-622
GBGIS	Great Britain Historical GIS Project	2011	[93]
GHC	Guide to the House of Commons	1882	[10]

† PP refers to the House of Commons Parliamentary Papers.

C.2 Local Government Areas

Pairs and Subdivisions of Parishes. The vast majority of English civil parishes (i.e., 13,189 of 13,869, or more than 95 percent) elected their own Poor Law guardians in 1881. The rest were subdivided into ”wards,” each of which elected their own guardians, or were combined into pairs, each of which elected their guardians jointly. In this essay I use CEG in order to identify which parishes were subdivided and which parishes were combined. Furthermore, I treat wards, parishes, and ”electoral units” as distinct from one another. I combine wards, when parishes were so subdivided, and treat them as a single unit. I leave ”combined parishes” combined. This yields 13,624 observations at the parish-level.

Poor Law Unions. The Poor Law Amendment Act of 1834 agglomerated English civil parishes into Poor Law unions, an administrative unit dedicated to the erection and maintenance of workhouses in which to relieve ”able-bodied” relief applicants. Between 1834 and 1881, Poor Law unions acquired a number of other administrative and statistical responsibilities, including, for example, the administration of vaccinations to children and, on behalf of the Registrar General, the recording of all English births, deaths, and marriages. In this essay I use CEG to match all 13,624 parish-level observations to the Poor Law unions (of which there were 576) to which they belonged.

Hundreds. English hundreds (also called ”wapentakes” in Derby, Lincoln, Leicester, Nottingham, and Rutland, and called ”wards” in Cumberland, Durham, Northumberland, and Westmorland) pre-dated Poor Law unions

as the principal intermediary geographical unit between the parish and the county. Indeed, English hundreds pre-dated even the Norman Invasion, and were enumerated in Domesday. See [103, p. 107] and [67, pp. 18-24]. The importance of the hundred had eroded to next to naught by the middle of the nineteenth century as a result of the introduction of the petty sessional division (for local judicial matters) and the Poor Law union (for local statistical and administrative matters). In this essay I use CR51 to match all 13,624 parish-level observations to the hundreds (of which there were 705) to which they belonged.

Registration Counties. English registration counties were agglomerations of English Poor Law unions established as a matter of statistical convenience in the wake of the Poor Law Amendment Act of 1834 (i.e., the Act that begat the Poor Law union) and the Registration Act of 1836 (i.e., the Act that begat the registration district). Since the boundaries of Poor Law unions regularly crossed the boundaries of the so-called "shires" or "ancient counties" (i.e., centuries-old Anglo-Saxon subdivisions of England), it was practicable to modify the old shire system to conform to the new Poor Law system. In this essay I use CR81 to match all 576 union-level observations (and, consequently, all 13,624 parish-level observations) to the registration counties (of which there were 42) to which they belonged.

Census Divisions. English census divisions were agglomerations of English registration counties established by the 1851 Census "for the convenient exposition of the facts relating to population, and the determination of the relation of these facts to others in equally large masses" [65, pp. 20-21]. In this essay I use CR81 to match all 576 union-level observations (and, con-

sequently, all 13,624 parish-level observations) to the census divisions (of which there were 11) to which they belonged. Table C.1 enumerates each of these divisions and the registration counties or parts of registration counties of which they were comprised.

Parliamentary Constituencies. English Parliamentary constituencies were subdivisions of England within which constituents were entitled to elect members of Parliament. They could take one of two forms: (*i*) *Parliamentary boroughs* or (*ii*) *Parliamentary divisions*. Parliamentary boroughs consisted of large (or, in some cases, formerly-large) towns that elected their own members of Parliament. Parliamentary divisions consisted of counties or subdivisions of counties, minus any Parliamentary boroughs (i.e., the "rest" of England). The West Cheshire Parliamentary division, for example, consisted of the western portion of the ancient county of Cheshire (i.e., the hundreds of Broxton, Eddisbury, Nantwich, and Wirral), excluding the Parliamentary boroughs of Birkenhead and Chester. In this essay I use CR81 to match all 13,624 parish-level observations to the Parliamentary boroughs (of which there were 186) or the Parliamentary divisions (of which there were 87) to which they belonged. Since Parliamentary constituencies could contain parts of parishes (i.e., a parish could be split between a Parliamentary borough and a Parliamentary division), I also use CR81 to obtain the population of each parish that lived within the boundaries of each of its Parliamentary constituencies.

Municipal Boroughs. English municipal boroughs, also called "municipal corporations," were areas within which mayors, town councils, and the other rudiments of municipal government were elected by so-called

"burgesses." Not all municipal boroughs were Parliamentary boroughs, and vice versa. Of the 259 English boroughs in 1881, 73 were municipal, 39 were Parliamentary, and 147 were both municipal and Parliamentary. In 92 of these latter 147, the municipal and Parliamentary boundaries were not identical. In this essay I use CR81 to match all 13,624 parish-level observations to the municipal boroughs (of which there were 220) to which they belonged. Since municipal boroughs, like Parliamentary boroughs, could contain parts of parishes, I use CR81 to obtain the population of each parish that lived within the boundaries of a municipal borough. This enables me to determine the proportion of the population of each parish-level and union-level observation that lived within the boundaries of a municipal borough.

GIS Identifiers. I use GBGIS to obtain the GIS identifiers of each English civil parish and each English Poor Law union and to match all 13,624 parish-level observations and all 576 union-level observations in my dataset thereto. This enables me to plot any of the variables enumerated in the following sections geographically.

C.3 Parish-Level Variables

Population. I obtain the population of each English parish in 1881 from CR81. The average parish consisted of 1,813 persons, but the average parish was unrepresentative of parishes in particularly urban or particularly rural areas. Of the 13,624 parish-level observations in my dataset, 14 were unpopulated, approximately 12 percent consisted of fewer than 100 persons, approximately 6 percent consisted of more than 5,000 persons, and 27 con-

sisted of more than 100,000 persons.

Number of Poor Law Guardians. I obtain the number of Poor Law guardians that represented each English parish in 1876 from CEG. All parishes were entitled to a certain number of representatives in the board of guardians of the union to which they belonged. Boards of guardians, on behalf of union ratepayers, determined the type (i.e., indoor or outdoor) and amount of relief that would be granted to relief applicants. Note that 81 percent of parishes were entitled to one guardian, 12 percent of parishes were entitled to two guardians, and 7 percent of parishes were entitled to more than two guardians. Also note that the size of boards of guardians varied across unions (from 5 to 111) and, therefore, that the administrative power of any one guardian (or of any one parish) depended upon the nature of the union to which he (or it) belonged.

Number of Contested Guardian Elections. I obtain the number of contested guardian elections held in each English parish between 1873 and 1875 from CEG. Since elections could be held at most once per year per parish (or, more precisely, per electoral unit), and since elections would be held (i.e., contested) only in the event that the number of guardian candidates exceeded the number of guardian seats apportioned to a parish, each parish could have held at most three elections between 1873 and 1875. In all, only 1,135 of 13,869 English electoral units held at least one election during this period—654 held one election, 255 held two elections, and 226 held three elections. This amounts to 1,842 total elections.

Number of Voting Papers Distributed and Collected. I obtain the number of voting papers distributed and collected in 1,339 of 1,842 contested

guardian elections in English parishes between 1873 and 1875 from CEG. In every guardian election, voting papers were distributed to all eligible voters at their places of residence and collected and tallied thereafter. Between 1873 and 1875, more than 2.3 million voting papers were distributed and more than 1.8 million voting papers were collected in contested English guardian elections. Average voter eligibility, as measured by the proportion of the population to which a voting paper was distributed, was roughly 13 percent. Average voter turnout, as measured by the proportion of eligible voters from which a voting paper was collected, was roughly 81 percent.

Number of Families and Separate Occupiers. I obtain the number of families and separate occupiers in 1881 in each English parish in which there was at least one guardian election between 1873 and 1875 from CR81. There were considerably fewer families than there were persons in England in 1881 since there were considerably fewer adults than there were children in England in 1881 (e.g., more than 46 percent of the English population was aged less than 20). Also note that "separate occupier" might mean a workhouse in which there could be between 100 and 1,000 persons.

Number of Inhabited Houses. I obtain the number of inhabited houses in 1881 in each English parish in which there was at least one guardian election between 1873 and 1875 from CR81. There were considerably fewer inhabited houses than there were families and separate occupiers in England in 1881 since there were considerably fewer inhabited (or inhabitable) dwellings than there were families in England in 1881 (e.g., in most large cities, multiple-family dwellings were commonplace).

Rateable Value. I obtain the amount of ratable value (i.e., property wealth)

in each English parish in 1881 from PRV. I aggregate rateable value per capita from the parish-level to the union-level in two ways, and in so doing I define the following two union-level variables: (*i*) *effective* ratable value per capita and (*ii*) *actual* rateable value per capita. The former weights each parish within a union by its guardian-share (i.e., the share of union guardians that represented a particular parish). The latter weights each parish within a union by its population-share (i.e., the share of union population that lived within a particular parish). I define my instrumental variable as the difference between effective and actual rateable value.

C.4 Union-Level Variables

Area. I obtain the area in acres of each English Poor Law union in 1881 from CR81. The average union consisted of approximately 55,000 acres (or approximately 85 square miles). The geographical size of unions was relatively uniform across England since unions were conceived so as to enable administrators and relief applicants to conveniently access their administrative center (i.e., the workhouse). Nevertheless, the relatively sparsely populated northernmost counties of England (i.e., Cumberland, Northumberland, etc.) tended to have larger unions (and more parishes per union) than did Metropolitan London. Of the 27 Metropolitan London unions, 25 consisted of fewer than 5,000 acres (and fewer than 10 parishes).

Coal and Cotton-Textile Production. I obtain indicators for whether coal production or cotton-textile production were "special occupations pursued" in each English Poor Law union in 1851 from CR51, according to which

roughly 15 percent of unions specialized in coal and roughly 7 percent of unions specialized in cotton-textiles. Coal unions (of which there were 89) were disproportionately concentrated in the West Midlands and in North of England (i.e., Census Divisions VI and X) and cotton-textile unions (of which there were 39) were disproportionately concentrated in North Western England (i.e., Census Division VIII).

Political Affiliation. I obtain the political affiliation (i.e., liberal or conservative) of each English member of Parliament (of which there were 462) in each English Parliamentary constituency (of which there were 273) in 1880 from GHC. Since the boundaries of Poor Law unions (and the boundaries of civil parishes) crossed the boundaries of Parliamentary constituencies, I calculate union-level political affiliation using the following formula.

$$\%\text{CONS}_u = \sum_{p \in u} \left(\left(\sum_{c \in p} \%\text{CONS}_c \times \frac{\text{POP}_{cpu}}{\text{POP}_{pu}} \right) \times \frac{\text{POP}_{pu}}{\text{POP}_u} \right) \tag{C.1}$$

$\%\text{CONS}_c$ is the proportion of Parliamentary constituency c's MPs that were affiliated with a conservative party. Note that in Parliamentary constituencies entitled to only one member of Parliament (of which there were 97), $\%\text{CONS}_c$ can only take a value of zero or one. The inner sum represents the political affiliation of each parish p. It weights the political affiliation of each Parliamentary constituency in each parish by the proportion of parish population (i.e., POP_{pu}) that lived in the Parliamentary constituency (i.e., POP_{cpu}). The outer sum represents the political affiliation of each union u. It weights the political affiliation of each parish in each union by the proportion of union population (i.e., POP_u) that lived in the parish (i.e., POP_{pu}) in 1881.

Percent Church Attendance. I obtain the proportion of the population of each English Poor Law union that attended a church service of any denomination on March 30th, 1851 from RWS. Although a day-count is not ideal, and may over- or under-state actual or average church attendance in any particular union, Eli & Slater (1994) demonstrate that there is little evidence of widespread falsification or manipulation of church attendance data by religious actors on behalf of their denominations in order to buoy denomination-specific attendance numbers [35].

Percent Non-Conformist. I obtain the proportion of religious sittings in each English Poor Law union in 1851 that were classified as non-Anglican Protestant (e.g., Presbyterian, Baptist, Unitarian, Wesleyan Methodist, etc.) from Table H of RWS. Available information includes the number of Anglican sittings, non-Anglican Protestant sittings, Roman Catholic sittings, and total religious sittings. I divide non-Anglican Protestant sittings by total sittings to obtain the percent of sittings that I call "non-conformist."

Number of Indoor and Outdoor Paupers. I obtain the number of paupers that were relieved in workhouses (i.e., indoor relief) and the number of paupers that were relieved via cash or in-kind payments (i.e., outdoor relief) in each Poor Law union on both January 1st and July 1st, 1881 from PRP1 and PRP2, respectively. I define, furthermore, INFRAC_u as the proportion of paupers that were relieved indoors. Available information includes the proportion of paupers that were male, female, and children (i.e., under sixteen years of age), and the proportion of paupers that were able-bodied, not able-bodied, and "lunatics, insane persons, and idiots."

Expenditure on Outdoor Paupers. I obtain the amount spent (in 1878

pounds) by each English Poor Law union between March 25th, 1877 and March 25th, 1878 (i.e., "Lady Day") on outdoor relief from LGB. Available information includes the amount spent on indoor relief, the amount spent on relief "for the maintenance of lunatics in asylums or other licensed houses," and the amount spent on "other expenses of or immediately connected with relief."

Proximity to Urban Centers and Urbanizers. I obtain the distance (in km) between the geographical center of each English Poor Law union and the geographical center of the nearest (*i*) *urban center* and (*ii*) *urbanizer* from GBGIS. I define urban center as any Poor Law union that contained, was contained by, or was coextensive with an urban sanitary district of more than 100,000 persons in 1881. There were 20 such urban centers according to CR81. Note that CR81 suggests that the division of the country into urban and rural sanitary districts (of which there were 1,005) "furnishes the best available basis" for identifying urban centers. Law (1967), for instance, distinguishes populous areas from genuine urban centers by invoking the importance of population density and nucleation [64]. I define urbanizer as any Poor Law union within which population grew by more than 75,000 persons between 1851 and 1881. There were 20 such urbanizers according to CR81. Table C.2 enumerates all urban centers (and their populations in 1881) and all urbanizers (and the change in their populations between 1851 and 1881).

Percent Agriculture. I obtain the proportion of the adult (i.e., older than 20) population in each English Poor Law union in 1881 that worked in agricultural production (as defined by the English census) from GBGIS. In particular, this work is based on data provided through

www.VisionofBritain.org.uk and uses statistical material which is copyright of the Great Britain Historical GIS Project, Humphrey Southall and the University of Portsmouth.

C.5 Trimming the Dataset

Irregular Unions. There are two English Poor Law unions that I deem "irregular:" (i) *London* and (ii) *Kington*. The City of London Poor Law union (as distinct from the county of Middlesex, or the Metropolitan Census Division) comprised 688 acres (or, roughly one square mile), 84 parishes, and 51,306 persons in 1881. It was geographically small, disproportionately geographically subdivided, and contained disproportionately more commercial property than residential housing. As such, all per capita wealth data pertaining to the City of London Poor Law union are almost certainly misleading. The Kington Poor Law union comprised 94,762 acres, 35 parishes, and 12,205 persons in 1881. Its parishes were split between the English county of Herefordshire and the Welsh county of Radnorshire. As such, parish-level information pertaining to Kington was absent from most English-specific sources. I discard each of these two unions. This yields 574 union-level observations.

Incorporated Unions. There are six English Poor Law unions that were not, in fact, "unions:" (*i*) *Exeter*, (*ii*) *Plymouth*, (*iii*) *Stoke Damerell*, (*iv*) *Bristol*, (*v*) *East & West Flegg*, and (*vi*) *Norwich* were "incorporations" established by Local Acts of Parliament (not by the Poor Law Amendment Act of 1834) that prescribed lifetime-guardianship. In each of these unions, guardian elec-

tions, when vacancies arose, were to be conducted at the union-level by aldermen rather than at the parish-level by eligible voters (see CEG, p. 18). I discard each of these six unions. This yields 568 union-level observations.

Unpopulated Parishes. There are fourteen English parishes with no recorded population in 1881, of which two were unrepresented and twelve were represented by one guardian. Since it is necessary to calculate the rateable value per capita of each of the parishes represented in a union's board of guardians in order to calculate that union's "effective" rateable value per capita, and since an unpopulated parish with positive rateable value has, by definition, an undefined ratable value per capita, I impose that population equals one in each of the twelve represented but unpopulated parishes. Table C.3 enumerates all fourteen unpopulated parishes, in ascending order of total rateable value.

C.6 Supplementary Tables

Table C.1: Census Divisions

CD #	CD Name	Counties
I	Metropolis	Kent†, Middlesex†, Surrey†
II	S. Eastern	Berkshire, Kent†, Southampton, Surrey†, Sussex
III	S. Midland	Beds., Bucks, Cambs., Herts., Hunts., Middlesex†, Northants., Oxon.
IV	Eastern	Essex, Norfolk, Suffolk
V	S. Western	Cornwall, Devon, Dorset, Somerset, Wiltshire
VI	W. Midland	Gloucs., Heref., Mon.††, Shrops., Staffs., Warks., Worcs.
VII	N. Midland	Derby, Leicester, Lincoln, Nottingham, Rutland
VIII	N. Western	Chester, Lancaster
IX	York	East Riding, North Riding, West Riding
X	Northern	Cumberland, Durham, Northumberland, Westmorland
XI	Wales	Excluded from Dataset

† Indicates that only part of county is included in the corresponding census division.

†† The classification of Monmouth is inconsistent across sources. Some, including DCR, classify Monmouth as a part of Census Division XI (i.e., Wales). Others classify Monmouth as a part of Census Division VI (i.e., West Midlands). I use the latter classification.

Table C.2: Urban Centers and Urbanizers

No.	Union, County	Pop.	Union, County	Change
1.	London, Middlesex†	3,816,156	London, Middlesex†	1,459,147
2.	Birmingham, Warwick	246,352	West Derby, Lancs.	322,899
3.	Liverpool, Lancs.	210,161	West Ham, Essex	166,374
4.	Bolton, Lancs.	192,413	Stockton, Durham	146,261
5.	Leeds, WR	190,863	Alston, Warwick	143,017
6.	Sheffield, WR	183,138	Chorlton, Lancs.	136,416
7.	Bradford, WR	183,032	Salford, Lancs.	94,011
8.	Blackburn, Lancs.	175,948	Edmonton, Middlesex	93,836
9.	Oldham, Lancs.	168,459	Leeds, WR	89,520
10.	Nottingham, Notts.	159,346	Barton Regis, Gloucs.	88,118
11.	Newc'stle, Northumb.	150,121	Croydon, Surrey	87,260
12.	Manchester, Lancs.	148,805	Blackburn, Lancs.	85,209
13.	Sunderland, Durham	139,376	Dewsbury, WR	81,928
14.	Portsea Island, Hants.	130,483	Oldham, Lancs.	81,674
15.	Leicester, Leicester	122,351	Sheffield, WR	79,536
16.	Stoke, Stafford	104,299	Bradford, WR	79,246
17.	Brighton, Sussex	99,074	Prestwich, Lancs.	77,770
18.	Hull, East Riding	78,236	Bolton, Lancs.	77,701
19.	Plymouth, Devon	75,096	Ecclesall Bierlow, WR	76,407
20.	Bristol, Gloucs.	57,499	Nottingham, Notts.	75,163

† Per convention, I define "London" as the Metropolitan Census Division. Note that the Metropolitan Census Division was not coincident with the county of Middlesex. Five Poor Law unions in the county of Middlesex (i.e., Brentford, Edmonton, Hendon, Staines, and Uxbridge) were in the South Midland Census Division (*not* in the Metropolitan Census Division). Six Poor Law unions *not* in the county of Middlesex (i.e., Camberwell, Greenwich, Lambeth, St. Olave, St. Saviour, and Wandsworth & Clapham) *were* in the Metropolitan Census Division.

Table C.3: Unpopulated Parishes

No.	Parish, Union, County	RV (£)	Representation
1.	Seven Acres, Boston, Lincoln	20	No Guardians†
2.	Gorewood, Cerne, Dorset	38	No Guardians†
3.	Dallinghoo Weald, Woodbridge, Suffolk	43	1 Guardian
4.	Chilton Common, Bridgwater, Somerset	75	1 Guardian
5.	Hill End, Clun, Shropshire	102	1 Guardian
6.	Monks Riding, Rugby, Warwick	110	1 Guardian
7.	Shuff Fen, Boston, Lincoln	135	1 Guardian
8.	Monks Risbridge, Risbridge, Suffolk	153	1 Guardian
9.	Pryors Hayes, Chester, Cheshire	155	1 Guardian
10.	East Woodyate, Wim. & Cran., Dorset	167	1 Guardian
11.	Royalty Farm, Boston, Lincoln	179	1 Guardian
12.	Friths, Boston, Lincoln	211	1 Guardian
13.	Grantham Grange, Grantham, Lincoln	315	1 Guardian
14.	Grafton, Chester, Cheshire	428	1 Guardian

† Only 20 parishes in England were unrepresented in their Poor Law union's board of guardians (see CEG), of which two had no population (as shown above), 12 had fewer than 100 persons, and 18 had fewer than 500 persons in 1881.

BIBLIOGRAPHY

[1] *Boards of Guardians: Return by Counties, England and Wales, showing, in Tabular Form for each Union, the Number of Chairmen and Vice-Chairmen respectively of Boards of Guardians who are Ex-Officio Members, or are Elected Guardians; and, the Number of Years that each such Chairman or Vice-Chairman has served in such Office*. Parl. Papers, 77, pages 553-572, 1893-94.

[2] *First Annual Report of the Local Government Board*. Parl. Papers, 28, pages 1-577, 1872.

[3] *First Annual Report of the Poor Law Commissioners for England and Wales*. Parl. Papers, 35, pages 107-374, 1835.

[4] *Report from His Majesty's Commissioners for Inquiring into the Administration and Practical Operation of the Poor Laws*. Parl. Papers, 27, pages 1-268, 1834.

[5] *Twenty-Second Annual Report of the Poor Law Board*. Parl. Papers, 35, pages 1-459, 1870.

[6] *The Unions' and Parish Officers' Year-Book for 1839: Containing Valuable Information on the Subject of Guardians, Relief, Accounts, and Rating under the Parochial Assessments Act*. Knight & Co., 1839.

[7] *Guide to the House of Commons (A New Parliament); Containing a List of the Members of the New Parliament, Compared with the Last; Their Politics; Population Tables; Number of Registered Electors; Number of Voters Polled at the Contested Elections; and Other Information*. P.S. King, 1857.

[8] *The Westminster Review, Vol. 115*, 1881.

[9] *Local Government Directory*. Knight & Co., 1881.

[10] *Guide to the House of Commons, Including Complete Returns of the General Election of 1880 and the Subsequent Changes in the Representation*. Ward, Lock & Co., 1882.

[11] *Local Government Directory*. Knight & Co., 1886.

[12] *The Lancet*, 91(2324):351–354, March 14th, 1968.

[13] The construction of workhouse infirmaries. *British Medical Journal*, 1(333), May 18th, 1867.

[14] Food Standards Agency. *McCance and Widdowson's The Composition of Foods, Sixth Summary Edition*. Royal Society of Chemistry, 2004.

[15] M. Alsan and C. Goldin. Watersheds in infant mortality: The role of effective water and sewage infrastructure, 1880-1915. *NBER Working Paper No. 21263*, 2015.

[16] I. Beeton. *The Book of Household Management*. S.O. Beeton, 1861.

[17] F. Bell and R. Millward. Public health expenditures and mortality in england and wales, 1870-1914. *Continuity and Change*, 13(2):221–249, 1998.

[18] R. Benabou and E.A. Ok. Social mobility and the demand for redistribution: The poum hypothesis. *Quarterly Journal of Economics*, 116(2):447–487, 2001.

[19] T. Besley and S. Coate. Workfare versus welfare: Incentive arguments for work requirements in poverty-alleviation programs. *American Economic Review*, 82(1):249–261, 1992.

[20] T. Besley, S. Coate, and T. Guinanne. Incentives, information, and welfarel england's new poor law and the workhouse test. In *History Matters: Essays on Economic Growth, Technology, and Demographic Change*, pages 245–270. Stanford University Press, 2004.

[21] C. Booth. *Life and Labour of the People in London*. MacMillan & Company, 1889.

[22] H. Bosanquet. *Social Work in London, 1869-1912: A History of the Charity Organization Society*. E.P. Dutton & Company, 1914.

[23] A.L. Bowley. The statistics of wages in the united kingdom during the last hundred years (part i: Agricultural wages). *Journal of Royal Statistical Society*, 61(4):702–722, 1898.

[24] G. Boyer. *An Economic History of the English Poor Law*. Cambridge University Press, 1990.

[25] G. Boyer and T. Hatton. New estimates of british unemployment, 1870-1913. *Journal of Economic History*, 62(3):643–675, 2002.

[26] A. Brundage. The landed interest and the new poor law: A reappraisal of the revolution in government. *English Historical Review*, 87(342):27–48, 1972.

[27] A. Brundage. Reform of the poor law electoral system, 1834-94. *Albion: A Quarterly Journal Concerned with British Studies*, 7(3):201–215, 1975.

[28] E. Cannan. Demographic statistics of the united kingdom: Their want of correlation and other defecits. *Journal of the Royal Statistical Society*, 61(1):49–82, 1898.

[29] T. Carlyle. Chartism. In *Essays, Vol. II: English and Other Critical Essays*, pages 165–238. Dent, 1839 (Reprinted 1964).

[30] G. Clark. What were the british earnings and prices then? (new series). `http://www.measuringworth.com`, 2015.

[31] D. Cutler and G. Miller. The role of public health improvements in health advances: The twentieth-century united states. *Demography*, 42(1):1–22, 2005.

[32] A. Deaton. *The Great Escape: Health, Wealth, and the Origins of Inequality*. Princeton University Press, 2013.

[33] A. Digby. The labour market and the continuity of social policy after 1834: The case of the eastern counties. *Economic History Review*, 28(1):69–83, 1975.

[34] R.A. Easterlin. The worldwide standard of living since 1800. *Journal of Economic Perspectives*, 14(1):7–26, 2000.

[35] P.S. Eli and T.R. Slater. The religious census of 1851: A computer-mapped survey of the church of england. *Journal of Historical Geography*, 20(1):44–61, 1994.

[36] F. Engels. *The Condition of the Working Class in England*. Oxford University Press, 1845 (Reprinted 2009).

[37] J.M. Eyler. Mortality statistics and victorian health policy: Program and criticism. *Bulletin of the History of Medicine*, 50(2):335–355, 1976.

[38] J.M. Eyler. *Victorian Social Medicine: The Ideas and Methods of William Farr*. Johns Hopkins University Press, 1979.

[39] C.H. Feinstein. *National Income, Expenditure, and Output of the United Kingdom, 1855-1965*. Cambridge University Press, 1972.

[40] J. Ferrie and W. Troesken. Water and chicago's mortality transition, 1850-1925. *Explorations in Economic History*, 45(1):1–16, 2008.

[41] A. Finkelstein. The aggregated effects of health insurance: Evidence from the introduction of medicare. *Quarterly Journal of Economics*, 100(1):1–37, 2007.

[42] R. Fogel. *The Escape from Hunger and Premature Death, 1700-2100*. Cambridge University Press, 2004.

[43] D. Fraser. *The Evolution of the British Welfare State: A History of Social Policy since the Industrial Revolution*. Palgrave Macmillan, 1973.

[44] A.H. Gale. Variations in the mortality and incidence of the common infectious diseases of childhood over a century. *Proceedings of the Royal Society of Medicine*, 36(3):97–104, 1943.

[45] I. Gazeley and S. Horrell. Nutrition in the english agricultural labourer's household over the course of the long nineteenth century. *Economic History Review*, 66(3):757–784, 2013.

[46] W.C. Glenn. *The Metropolitan Poor Act, 1867 (with Notes and Appendix of Incorporated Statutes)*. Shaw & Sons, 1867.

[47] W.C. Glenn. *The General Consolidated Order and Others of the Poor Law Commissioners and the Poor Law Board; with Explanatory Notes Elucidating the Orders, Tables of Statutes, Cases, and Index to the Orders and Notes: 6th Edition*. Knight & Co., 1868.

[48] S. Guha. The importance of social intervention in england's mortality decline: The evidence reviewed. *Social History of Medicine*, 7(1):89–113, 1994.

[49] C. Hamlin. *Public Health and Social Justice in the Age of Chadwick: Britain, 1800-54*. Cambridge University Press, 1998.

[50] C. Hamlin and S. Sheard. Revolutions in public health: 1848, and 1998? *British Medical Journal*, 317(7158):587–591, 1998.

[51] E.M. Hampson. *The Treatment of Poverty in Cambridgeshire, 1597-1834*. Cambridge University Press, 1934.

[52] A. Hardy. Death is the cure of all diseases: Using the general register office cause of death statistics for 1837-1920. *Social History of Medicine*, 7(3):472–492, 1994.

[53] J.A. Hassan. The growth and impact of the british water industry in the nineteenth century. *Economic History Review*, 38(4):531–547, 1985.

[54] R.G. Hodgkinson. *The Origins of the National Health Service: The Medical Services of the New Poor Law, 1834-1871*. University of California Press, 1967.

[55] E.H. Hunt. *Regional Wage Variations in Britain, 1850-1914*. Oxford University Press, 1973.

[56] E.H. Hunt. *British Labour History, 1815-1914*. Weidenfeld & Nicolson, 1981.

[57] E.T. Hurren. Agricultural trade unionism and the crusade against outdoor relief: Poor law politics in the brixworth union, northamptonshire, 1870-1875. *Agricultural History Review*, 48(2):200–222, 2000.

[58] E.T. Hurren. *Protesting about Pauperism: Poverty, Politics and Poor Relief in Late-Victorian England, 1870-1900*. Boydell Press, 2007.

[59] B. Keith-Lucas. *The English Local Government Franchise: A Short History*. Basil Blackwell, 1952.

[60] L.L. Kiesling. Collective action and assisting the poor: The political economy of income assistance during the lancashire cotton famine. *Journal of Economic History*, 55(2):380–383, 1995.

[61] S.W. Kim and P.V. Fishback. Institutional change, compensating differentials, and accident risk in american railroading, 1892-1945. *Journal of Economic History*, 53(4):796–823, 1993.

[62] P. Krugman. Real america versus senate america. *The New York Times*, November 8th, 2018.

[63] R. Lambert. Central and local relations in mid-victorian england: The local government act office, 1858-71. *Victorian Studies*, 6(2):121–150, 1962.

[64] C.M. Law. The growth of the urban population in england and wales, 1801-1911. *Transactions of the Institute of British Geographers*, (41):125–143, 1967.

[65] J. Lewis. *Digest of the English Census of 1871, Compiled from the Official Returns*. Edward Stanford, 1873.

[66] P. Lindert. *Growing Public: Social Spending and Economic Growth since the Eighteenth Century*. Cambridge University Press, 2004.

[67] V.D. Lipman. *Local Government Areas, 1834-1945*. Basil Blackwell, 1949.

[68] W.P.D. Logan. Mortality in england and wales from 1848 to 1947. *Population Studies*, 4(2):132–178, 1950.

[69] G.B. Longstaff. The recent decline in the english death rate considered in connection with the cause of death. *Journal of the Statistical Society of London*, 47(2):221–258, 1884.

[70] B. Luckin. Death and survival in the city: Approaches to the history of disease. *Urban History*, 7:53–62, 1980.

[71] W.G. Lumley. *The New Sanitary Laws: The Public Health Act, 1848, and the Local Government Act, 1858; An Introduction, Notes, and Index*. Shaw & Sons, 1859.

[72] T. MacKay. *Methods of Social Reform*. John Murray, 1896.

[73] T. MacKay. *A History of the English Poor Law: Vol. 3*. Sentry Press, 1898 (Reprinted 1967).

[74] M. MacKinnon. English poor law policy and the crusade against outrelief. *Journal of Economic History*, 47(3):603–625, 1987.

[75] J. Madison. Number 62. In *The Federalist Papers*, pages 400–407. Random House, 1788 (Reprinted 1937).

[76] T. Malthus. *An Essay on the Principle of Population: First Edition*. Oxford University Press, 1798 (Reprinted 2008).

[77] D. Marshall. Revisions in economic history: Vii. the old poor law, 1662-1795. *Economic History Review*, 8(1):38–47, 1937.

[78] D. Matthews. The senate is undemocratic and it matters. *Vox*, January 6th, 2015.

[79] S.R.T. Mayer. Charles knight. In *Notes and Queries: A Medium of Intercommunication for Literary Men, General Readers, &c.*, pages 419–420. John Francis, 1873.

[80] T. McKeown. *The Rise of Modern Population*. Academic Press, 1976.

[81] T. McKeown and R.G. Record. Reasons for the decline of mortality in england and wales during the nineteenth century. *Population Studies*, 16(2):94–122, 1962.

[82] A. Meltzer and S.F. Richard. A rational theory of the size of government. *Journal of Political Economy*, 89(5):914–927, 1981.

[83] W.H. Michael. The public health act of 1872: Its defects and suggested amendments. *British Medical Journal*, 1(692):443–446, 1874.

[84] R. Moffit. An economic model of welfare stigma. *American Economic Review*, 73(5):1023–1035, 1983.

[85] G. Nicholls. *A History of the English Poor Law: Two Volumes*. P.S. King, 1898.

[86] A.L. Nichols and R.J. Zeckhauser. Targeting transfers through restrictions on recipients. *American Economic Review*, 72(2):372–377, 1982.

[87] U.S. Bureau of Economic Analysis. State annual personal income, 2018 (preliminary). `http://www.bea.gov/data/income-saving/personal-income-by-state`, 2019.

[88] L.H. Officer and S.H. Williamson. Computing 'real value' over time with a conversion between u.k. pounds and u.s. dollars, 1774 to present. `http://www.measuringworth.com/exchange/`, 2016.

[89] E.W. Orts. The path to give california 12 senators, and vermont just one. *The Atlantic*, January 2nd, 2019.

[90] S. Phillips. A review of mortality statistics during the last half century. *Clinical Journal*, 32(4):55–61, 1908.

[91] K. Polyani. *The Great Transformation*. Farrar & Rinehart, 1944.

[92] S. Preston. American longevity: Past, present, and future. *Syracuse University, Maxwell School, Center for Policy Research Policy Brief*, July 1996.

[93] Great Britain Historical GIS Project. *Great Britain Historical GIS*. University of Portsmouth, 2011.

[94] J. Redlich and F.W. Hirst. *Local Government in England*. MacMillan, 1903.

[95] D. Ricardo. *On the Principles of Political Economy and Taxation: Third Edition*. Cambridge University Press, 1817 (Reprinted 1851).

[96] G.K. Rickards. *The Statutes of the United Kingdom of Great Britain and Ireland with Notes and References, Tables Showing the Effect of the Year's Legislation, and a Copious Index, Vol. 29*. George Edward Eyre & William Spottiswoode, 1869.

[97] G. Rosen. *A History of Public Health*. M.D. Publications, 1958.

[98] B.S. Rowntree. *Poverty: A Study of Town Life*. MacMillan, 1901 (Reprinted 1908).

[99] E. Smith. *A Guide to the Construction and Management of Workhouses; Together with the Consolidated Order as Amended by Subsequent Orders of the Poor Law Board*. Knight & Co., 1870.

[100] D.D. Smyth. Wealth and welfare. *Quarterly Journal of Economics*, 18(1):138–142, 1903.

[101] P. Solar. Poor relief and english economic development before the industrial revolution. *Economic History Review*, 48(1):1–22, 1995.

[102] R.H. Steckel and R. Floud. Conclusions. In *Health and Welfare During Industrialization*, pages 423–449. University of Chicago Press, 1997.

[103] W. Stubbs. *The Constitutional History of England: Its Origin and Development, Vol. 1*. Oxford University Press, 1903.

[104] S. Szreter. The importance of social intervention in britain's mortality decline, c. 1850-1914: A reinterpretation of the role of public health. *Social History of Medicine*, 1(1):1–38, 1988.

[105] S. Szreter. Mortality in england in the eighteenth and the nineteenth centuries: A reply to sumit guha. *Social History of Medicine*, 4(3):435–643, 1994.

[106] S. Szreter. Economic growth, disruption, deprivation, disease, and death: On the importance of the politics of public health for development. *Population and Development Review*, 23(4):693–728, 1997.

[107] E.P. Thompson. *The Making of the English Working Class*. Vintage, 1966.

[108] W.K. Viscusi. Labor market valuations of life and limb: Empirical evidence and policy implications. *Public Policy*, 26(3):359–386, 1978.

[109] W.K. Viscusi and J.E. Aldy. The value of a statistical life: A critical view of market estimates throughout the world. *Journal of Risk and Uncertainty*, 27(1):5–76, 2003.

[110] T. Watson. Public health investments and the infant mortality gap: Evidence from federal sanitation interventions on u.s. indian reservations. *Journal of Public Economics*, 90(8-9):1537–1560, 2006.

[111] B. Webb and S. Webb. *English Local Government from the Revolution to the Municipal Corporations Act, Vol. 1: The Parish and the County*. Longmans, Green & Co., 1906.

[112] B. Webb and S. Webb. *English Poor Law Policy*. Longmans, Green & Co., 1910.

[113] B. Webb and S. Webb. *English Local Government: English Poor Law History, The Old Poor Law*. Longmans, Green & Co., 1927.

[114] K. Williams. *From Pauperism to Poverty*. Routledge & Kegan Paul, 1981.

[115] C.H. Wooddy. Is the senate unrepresentative? *Political Science Quarterly*, 41(2):219–239, 1926.

[116] R.S. Wright and H. Hobhouse. *An Outline of Local Government and Local Taxation in England and Wales (Excluding London)*. Sweet & Maxwell, 1906.